

Description

The present invention relates to window coverings provided with adjustable vanes for controlling the amount of light passing therethrough, and to methods and apparatus for producing such a window covering.

Fabric window coverings are often preferred by consumers because of the softer appearance relative to traditional venetian blinds, the uniform appearance which they provide to a window, and the insulating properties associated with cellular fabric shades.

US-A-4450027 discloses cellular window coverings which may be made of fabric or film materials. During manufacture, a flexible strip material is folded into a continuous longitudinal tube and the longitudinal folds thus created are permanently set by passing the tubing material around a heat setting wheel. Adhesive is applied along one side of the flattened tubular material which is subsequently stacked by winding onto a rack having flat surfaces. The adhesive is thus pressed onto the next layer wound onto the rack to form a bonded unitary stack of closed tubular cells. When the ends are cut from the rack the stack may be expanded and the permanently set creases provide a neat and uniform outward appearance.

US-A-4732630 discloses a modification of this process in which a hot-melt adhesive is applied to one side of the tubular material. After the flat tubular strips have been stacked and cut, they are placed in an oven under pressure and the hot-melt adhesive is activated to bond the layers together.

While such window coverings are generally satisfactory they do not have the ability to control the amount of light admitted through the window covering, similar to a traditional venetian blind. Attempts to provide this have been less than successful.

US-A-3384519 discloses one such attempt in which two cloth layers spaced apart by movable parallel blades having each of their marginal edges heat-welded to one of the movable cloth layers. Relative movement of the two cloth layers in a direction perpendicular to the blades changes the angle of the blade and thus controls the amount of light admitted through the article. Because this window covering is constructed utilizing a heat-welding process, fabrics which may be utilized are limited to thermoplastic materials. Also, heat-welding necessarily requires a melting of at least some of the fibers of the materials bonded, thus providing an uneven outer appearance along the heat-welds and producing unwanted crimps or creases in the materials, which can result in fatigue failure. Further, heat-welding is a relatively slow process which may require six or more seconds to create a bond over an extended length. This is too slow for application in high volume commercial production processes. Other drawbacks are that heat welds are limited in strength, especially at elevated temperatures experienced by an insulating type shade placed

adjacent a sunlit window and the difficulty in achieving uniformly straight heat welded joints over an extended length.

US-A-2865446 discloses a window covering in which a long rectangular piece of fabric is doubled back upon itself and a plurality of pleated elements are placed between the folded over sheets. The pleated elements are an accordion-pleated fabric which extends when the two sides of the folded over fabric are moved relative to one another in a direction perpendicular to the accordion pleats. Such a window covering does not provide a uniform appearance because the accordion-pleated fabric located closer to the top of the window covering does not expand to the same extent as the fabric closer to the bottom. Also, it is very difficult to ensure that such accordion-pleated fabric return to its desired position after each expansion.

This construction inherently creates an undesirable feature if a woven type sheer fabric is used for the folded over, long rectangular piece of fabric. That undesirable feature is a moire effect or interference pattern which would result when light is viewed through the folded over fabric. The structure of US-A-3384519 would also appear to have this drawback because the embodiment shown in Figure 8 of that patent appears to use front and back fabrics of the same material.

FR-A-1309194 discloses a curtain with variable opacity, in which screen or mesh parallel sides are provided with tiltable braids therebetween. The braids are said to be attached at their edges to the sides, however, no means for attachment is specified. The drawings appear to indicate a hinged type attachment and the specification ends by stating that the difficulties of construction are substantial.

According to the present invention there is provided a light control window covering comprising a first relatively translucent sheet of material, a second relatively translucent sheet of material, disposed parallel to said first sheet, a plurality of strips of relatively opaque material, each having edge portions, and said strips having their edge portions bonded to said first sheet and said second sheet, respectively, whereby central portions of said strips form vanes which, in a first closed position of said window covering are substantially planar and extend substantially parallel to the first and second sheets effective at least partially to block transmission of light and, in a second position of said window covering extend generally transverse to said first and second sheets, effective to transmit light between said vanes, characterised in that one of said first and second sheets is an open fabric having threads defining interstices therebetween and the other of said sheets is either a non-woven sheer material, such as a plastics material or an open sheer fabric having threads defining interstices therebetween, the interstices of one sheet being of a different

size and/or shape and/or of a different orientation from those of the other sheet, whereby the appearance of a moire effect is avoided when light is viewed through both of the fabric sheets.

Such a structure is readily usable to control light passing through a window and yet avoids the production of interference patterns, known as the moire effect.

The structure of the invention can have a neat and uniform construction and outer appearance in all degrees of light control. Preferably the light control vanes are adhesively bonded to the sheer fabric utilizing linear application of the adhesive and, thus, a high degree of controllability of the adhesive application process and bonding of the vane. Such a feature provides advantages other than simply an improved outward appearance. The precisely uniform construction improves the operation of the blind by preventing warps or distortions from developing over the life of the blind.

The window covering of the invention can operate with a high degree of repeatability, that is, always returns to the same appearance when closed. Thus, a feature of the present invention is attachment of the vanes to the sheer fabric sides such that the vanes tend to bias the window covering toward the minimum light admitting position. A further feature of the invention in this respect is a novel heat setting of the three layers together in order to provide a uniform and wrinkle-free shade at any temperature in subsequent use. These features allow the window covering to maintain its original shape and appearance even in the presence of temperature extremes encountered in a window environment.

The invention also provides a method for manufacturing a fabric light control window covering, comprising providing first and second wide relatively translucent sheets of sheer material of the same given width, feeding longitudinally a narrow strip relatively opaque material, cutting the strip of material into individual lengths substantially equal to said given width of first and second sheets, said strip material having first and second edges and first and second sides; positioning the first side of the cut lengths of narrow strip material along the first edge against the first sheet material; positioning said second wide sheet material to contact the second side of the individual lengths of narrow strip material and bonding together the first wide sheet material, the individual lengths of narrow strip material and second wide sheet material to form a bonded sandwich in which the first and second wide sheet materials are movable relative to each other in a direction perpendicular to the individual lengths of narrow strip material, characterised by the steps of applying a first adhesive line longitudinally to the narrow strip material adjacent the first edge on the first side; applying a second adhesive line longitudinally to the narrow strip material ad-

jacent the second edge on the second side; disposing said first wide sheet material with its longitudinal axis perpendicular to the axes of said narrow strip material and pressing together the first wide sheet material, the individual lengths of narrow strip material and the second wide sheet material to form said bonded sandwich.

The present invention also provides an apparatus for fabricating a light control window covering, comprising means for continuously feeding a narrow strip material longitudinally at a first rate, means for continuously feeding first and second wide sheet materials at a second rate longitudinally in a direction perpendicular to said strip material longitudinal direction; means for forming a bonded sandwich comprising three layers, said layers being the narrow strip material between the first and second wide sheet materials; characterised in that said means for forming a bonded sandwich comprise means for applying adhesive to the narrow strip material in two lines, a first said line being applied adjacent a first edge on a first side of said material and a second said line being applied adjacent a second edge on a second side of said material; means for cutting the narrow strip material into plural individual strips of a length equal to the width of said wide sheet materials; means for uniformly pressing said individual strips against said first wide sheet material transversely across the width of said sheet material to adhesively bond or tack bond said cut strips to said first sheet material; and means for forcing said cut strips, bonded or tack bonded to said first wide sheet material, out of the way of a cut strip to be subsequently pressed and bonded to said first sheet material; belts between which the sandwich of layers is passed and heating and cooling surfaces for successively heating and cooling the belts for setting the sandwich of layers at a uniform temperature-size relationship with respect to each other.

Included in one embodiment of apparatus of the invention is a means for positioning the first sheer fabric in order to stop a portion for application of a cut strip and then reposition and stop the fabric before the application of the next cut strip while maintaining a constant feed rate for the first sheer fabric. This portion of the apparatus may comprise two dancer rollers around which the first sheer fabric runs. The dancer rollers are mounted on shafts which form the pivot points of a linkage around its frame. The linkage causes the dancer rollers to act in concert and the timing of the rotation of the linkage is controlled by an appropriately shaped cam member.

A heat setting means may be provided in which the sandwiched layers of the window covering pass between first and second adjacent endless belts. The belts each run across hot and cool surfaces to successively heat and cool the window covering. In one embodiment, the hot and cool surfaces are rollers and tension induced in the belts causes a pressure to

be exerted on the sandwiched layers, thus maintaining the layers under constant and uniform pressure at a tension significantly less than the tension induced in the endless belts. In another embodiment, the hot and cool surfaces are flat plates disposed opposite air plenums and the pressure exerted on the sandwiched layers is due to the biasing of the belts toward the flat plates by pressurized air supplied to the air plenums. Alternatively, the hot and cool surfaces may be pairs of oppositely disposed flat plates biased against the belts. Heat setting in these manners allows the sandwiched layers to be set to a uniform temperature and size relationship to prevent distortions in subsequent use.

Also, included in a preferred embodiment of the invention is a heat setting means wherein the first endless belt passes around a hot roller and the second endless belt passes around a cool roller. The location of the belts and rollers is arranged such that the second endless belt also passes around the hot roller outside of the first endless belt and the first endless belt passes around the cool roller for short distance outside of the second endless belt. With this arrangement the sandwiched layers of the window covering may be passed between the two belts, around the hot and cool rollers.

A hot knife cutting assembly is preferably provided to cut the final fabric to desired lateral widths and/or to trim the lateral edges of the final fabric. The hot knife cutting assembly operates such that the three layer sandwich fabric is cut cleanly, without any heat sealing of the lateral edges of the individual fabric layers to one another.

In order that the present invention may more readily be understood, the following description is given, merely by way of example, reference being made to the accompanying drawings in which:-

Figure 1 is a front elevation of a preferred embodiment of the apparatus according to the present invention;

Figure 2 is a left side elevation of the apparatus of Figure 1;

Figure 3 is a diagrammatic view generally representing the apparatus as viewed along line 3-3 in Figure 1;

Figure 4 is an enlarged perspective view of the vane material used in the present invention as viewed through line 4-4 in Figure 1;

Figure 5 is an enlarged perspective view at box 5 in Figure 3 of the sheer fabric with attached vane material;

Figure 6 is a perspective end view of a fabric light control window covering of the present invention;

Figure 7 is a perspective end view of the window covering of the invention in a different position;

Figure 8 is a diagrammatic illustration of a preferred embodiment of the cutting means of the present invention;

Figure 9 is a diagrammatic illustration of an alternative embodiment of the heat setting apparatus of the invention;

Figure 10 is a diagrammatic illustration of another embodiment of the heat setting method and apparatus of the invention;

Figure 11 is a side view of a hot knife cutting assembly according to the invention;

Figure 12 is a side view of a second embodiment of a fabric light control window covering according to the present invention;

Figure 13 is an end view of a vane material for the fabric light control window covering in Figure 12; and

Figure 14 is a diagrammatic, cross-sectional illustration of still further embodiment of the heat setting method and apparatus of the invention.

Referring first to Figure 1, vane material 10 is provided as a continuous strip material from supply roll 12, passes around idler roller 13 mounted on frame 14 and then enters adhesive applicator assembly 20, where adhesive nozzles 21 apply a thin line 16 of hot-melt or other adhesive to each side of the vane material 10 (see Figure 4).

In assembly 20 vane material 10 first passes around alignment roller 22, which is provided with raised edges and next passes around two backup rollers 23 over each of which a nozzle 21 is disposed. Backup roller 23 is mounted on arm 24 and shaft 26 which pivots in bearing 25 to allow for adjustment of the spacing between the glue nozzle 21 and vane material 10 on backup roller 23. Preferably, the spacing is adjusted to provide a flat glue line, as shown in Figure 4, this enabling greater control of the amount of adhesive applied and the degree of flow when subsequently squeezed between two materials. With a 51 mm wide vane material 10, the dimensions of the adhesive lines are preferably about a height of 0.076 mm and a width of 1.52 mm.

Driven roller 27 is provided to assist in feeding the vane material and is positioned to ensure that vane material 10 has sufficient contact with backup roller 23. By passing vane material 10 under stationary nozzles 21, the adhesive lines are applied due to the linear motion of the vane material 10 in its longitudinal direction. In this manner great precision can be achieved in the application of the adhesive lines.

As illustrated in Figure 4, adhesive lines 16a and 16b are disposed on vane material 10 adjacent opposite edges and on opposite sides of the material.

In a preferred embodiment of the present invention, the adhesive used is a co-polyester hot-melt adhesive. This adhesive melts and flows at about 177°C and provides excellent strength over the temperature range to which the window covering will be exposed in use. It also provides a tack bond at slightly lower temperatures around 104°C which is useful in subsequent steps as described below.

This type of adhesive however does have the undesirable characteristic of yellowing when heated and maintained in a melted state for extended periods of time. In order to prevent yellowing, it is necessary to heat only a small amount of adhesive at a time. For this purpose, hot-melt adhesive in the form of pellets is placed in hopper 30. The pellets drop into caulking cartridge 32 which is provided with a pneumatic piston 34 that forces the pellets into heating block 35. Electric heating elements 36 heat heating block 35 to melt a small amount of adhesive just before it is forced into a metering gear pump which pumps the adhesive into nozzles 21. With this arrangement as little as 114 g of adhesive is melted at one time.

A gear pump, preferably a positive displacement pump, is disposed within heating block 35 to pump the melted adhesive to nozzles 21. The gear pump is powered proportionally to the vane material 10 feed speed such that the amount of glue deposited on the vane material 10 remains constant at whatever speed the vane material is fed.

After leaving the adhesive applicator assembly 20 vane material 10, with applied adhesive lines 16a, 16b, passes around idler rollers 33, 37. The vane material then travels around alignment roller 38 which has raised edges to align the vane material and a further idler roller 39. Vane material 10 then travels into cutter assembly 40 (see Figure 8).

In the cutter assembly, vane material 10 first passes around an alignment roller 41, which has raised edges and then passes between backup roller 42 and nip roller 44. Nip roller 44 is mounted on a pivotable spring biased arm 43 in order to maintain a constant pressure against the backup roller 42 and prevent slippage of vane material 10. Backup roller 42 is also a driven roller which pulls the vane material through the apparatus. Adjacent to backup roller 42 is cutting roller 49, having a blade 50 on the circumference parallel to the roller axis. Cutting roller 49 and backup roller 42 are spaced apart a distance sufficient to prevent blade 50 from cutting vane material 10 on each rotation of the rollers.

Cutting roller 49 is rotatably mounted on bracket 48 which pivots on shaft 51. After the desired length of fabric is fed around backup roller 42, pneumatic cylinder 46, mounted on bracket 47 and acting through linkage 45, causes bracket 48 to pivot to the left so that blade 50 contacts and cuts material 10 to form individual vane strips 10a. Linkage 45 comprises a clevis 52 attached to the end of the cylinder piston and three connecting rods 52, 54, 58 joined at pivot point 56 and pivotably connected at clevis 52, cutter assembly frame 57 and bracket 48, respectively. The downward motion exerted by cylinder 46 causes pivot point 56 to move down and thus pivots bracket 48 to the left around shaft 51.

Pneumatic cylinder 46 is controlled by a pneumatic valve (not shown) cooperating with the backup roll-

er shaft. After the number of rotations of backup roller 42 corresponding to the desired length of vane material 10, the pneumatic valve opens to actuate pneumatic cylinder 46 and thus move blade 50 to the cutting position. Backup roller 42 and cutting roller 49 are both driven rollers travelling at the same speed in order to prevent a scraping action of blade 50 along backup roller 42.

In an alternative embodiment, nip roller 44 and biased arm 43 are eliminated. Instead, cutting roller 49 is surrounded by a compressible rubber liner having an outer diameter slightly greater than the radial extension of blade 50 and contacting backup roller 42. The contact between the cutting roller rubber liner and backup roller 42 creates a nip for pulling fabric through the apparatus. When air cylinder 46 causes bracket 48 to move slightly to the left to cut the vane material, the rubber liner is compressed against backup roller 42 to expose cutting blade 50 and thus cut vane material 10.

After vane material 10 passes around backup roller 42 it falls onto vacuum belt 62 which is part of vacuum separator assembly 60. In Figure 8 vane material 10 is shown slightly above belt 62 in order clearly to distinguish the two parts. In practice material 10 is pulled against belt 62. Vacuum separator assembly 60 separates the cut strips 10a of vane material in order to provide a sufficient distance between the strips to allow time for subsequent processing steps performed on the individual strips 10a. Vacuum belt 62 is provided with holes, which are best seen in Figures 2 and 3, and travels around drive wheel 61, idler wheel 63 and idler wheel 70 which is mounted on screw tension adjustment 67, this allowing the tension in vacuum belt 62 to be adjusted by turning screws 67a. Vacuum belt 62 is supported along its top run 62a by hollow frame 64. The space within hollow frame 64 is evacuated by vacuum hoses 69, thus causing a suction through the holes of vacuum belt 62, to pull the vane material against vacuum belt 62 as it comes off backup roller 42.

In order to provide the spacing between the cut strips 10a of vane material, vacuum belt 62 travels approximately twice as fast as the linear feed speed of vane material 10. Thus, as the uncut vane material 10 passes backup roller 42, it is pulled against vacuum belt 62, but because it is moving at a slower speed, uncut vane material 10 slides along vacuum belt 62. The cut vane material 10a is separated from the uncut vane material 10 due to the greater speed of belt 62. A nip roller 65 is located a distance from the point of contact between blade 50 and backup roller 42 slightly less than the desired length of individual cut strips 10a. Pneumatic cylinder 66 acts on arm 68 carrying nip roller 65 to press it against belt 62. Cylinder 65 is actuated at the same time as cylinder 46, whereby when vane material 10 is cut, nip roller 65 presses cut strip 10a against vacuum belt 62 to ensure its separation.

ration from the uncut vane material.

The cutting assembly 40 and separator assembly 60 allow for successful handling of relatively soft fabrics for the vanes 10a. This is a significant advantage over the prior art because soft fabrics provide a more pleasing appearance in the final product.

Referring to Figure 3, first sheer fabric 72 is fed from supply roller 74 around idler 75, dancer roller 76 and preheat shoe 78. The cut vane 10a is carried beneath a portion of first sheer fabric 72 which is resting against a preheat shoe 78, which heats first sheer fabric 72 to approximately 104°C. First sheer fabric 72 is fed with its longitudinal direction perpendicular to the longitudinal direction of the vane 10a. The width of first sheer fabric 72 corresponds substantially to the cut length of vane 10a.

When vane 10a reaches alignment with the opposite edge of first sheer fabric 72, photo eye 80 senses the end of vane 10a and activates a kicker bar 82 located on one side of vacuum belt 82 and directly below adhesive line 16a. Kicker bar 82 pushes the front edge of vane 10a upwards and presses adhesive line 16a on vane 10a against the preheated first sheer fabric 72, to create a tack bond between vane 10a and first sheer fabric 72, thus holding vane 10a in place. Kicker bar 82 then retracts downwards and out of the way of the next vane. Kicker bar 82 is mounted on a number of pneumatic cylinders 83 which provide the pressing force and accomplish the tack bond cycle within about one-tenth of a second. First sheer fabric 72 with tack bonded vanes 10a, as shown in Figure 5, then moves around dancer roller 84 and idler roller 86 into heat setting assembly 100.

In the window covering according to the present invention it is preferred to have the vanes slightly overlapping in the closed position in order to fully block the passage of light. This overlap requirement somewhat complicates the production of the window covering in order to prevent the subsequently attached vane from being adhered to the previous vane instead of the sheer fabric. For this purpose, dancer rollers 76 and 84 continuously reposition first sheer fabric 72, which is fed at a continuous rate and pulled through the apparatus by the heat setting assembly 100. If, for example, a 51 mm wide vane material is used, the overlap of the vanes is preferably about 6.5 mm. Therefore, the first sheer fabric 72 is advanced a total of 44.5 mm for each vane 10a applied. After a vane 10a has been applied, dancer roller 76 moves downward and dancer roller 84 moves to the left as shown in Figure 3. This causes first sheer fabric 72 to be moved forward a total of 69.9 mm at a rate faster than that at which fabric 72 is actually being fed. The forward movement of 69.9 mm allows the tack bonded vane 10a to move completely out of the way of the next vane to be applied. From this point, first sheer fabric 72 is moved backward 25.4 mm by the dancer rollers in order to assume the proper position of a total

of 44.5 mm advancement. This positions the first sheer fabric 72 in place for the next vane 10a to be applied.

As the backward motion occurs, air jets 79 blow a jet of air through first sheer fabric 72 on to applied vane 10a to force it out of the way of kicker bar 82. A number of air jets 79 may be positioned along the width of first sheer fabric 72 just after kicker bar 82. Air jets 79 may provide a continuing airflow or may be timed to blow only during the backward motion of the dancers.

In order to maintain first sheer fabric 72 in a stationary position while the next vane 10a is applied, dancer rollers 84 and 76 continue to move back slowly exactly to counter the effect of the forward pull of heat setting assembly 100. Thus, first sheer fabric 72 between dancer rollers 76 and 84 remains briefly stationary. This prevents adhesive line 16a from being smeared when vane 10a is applied and also allows first sheer fabric 72 to become sufficiently preheated by remaining stationary on the preheat shoe 78. Once kicker bar 82 tack bonds the next vane 10a to first sheer fabric 72, the positioning process repeats.

In a preferred embodiment of the present invention a single motor drive system is utilized to power adhesive applicator assembly 20, cutter assembly 40, vacuum separator assembly 60, dancer rollers 84 and 86, and heat setting assembly 100. Dancer rollers 76 and 84 are mounted on arms 89 and 85, respectively, which in turn are mounted on shafts 88 and 87, respectively. As shown in Figures 1, 2 and 3, shafts 87 and 88 extend through frame 14 and are linked together by arms 90 and 91 and connecting rod 92. Arm 91 rides on cam 93 which is rotated by a shaft linked to the single motor drive system. An extension spring 94 maintains arm 91 in contact with cam 93, which is shaped to move dancer rollers 76 and 84 just described.

As can be seen in Figure 1, vacuum belt 62 extends beyond frame 14 at the left end of the apparatus. When a new vane material is placed on a supply roller 12, its leading edge may be simply taped to the trailing edge of the last vane material. Then, when the cut strip containing the taped splice approaches first sheer fabric 72, kicker bar 82 and the sheer fabric feed may be temporarily deactivated to allow the spliced portion of vane material to exit at the left side of the apparatus. When clean cut strips 10a of vane material begin to exit at the left side, the sheer fabric feed and kicker bar 82 are reactivated. This allows quick changes of vane material without introducing flaws into the final product or requiring lengthy set up times.

As can be seen in Figure 3, second sheer fabric 96 is fed from supply roller 97 around idler roller 98 and laid up against first sheer fabric 72 with tack bonded vanes 10a. The three-layer sandwich of first sheer fabric 72, vanes 10a and second sheer fabric 96

travels over idler 101, around heating roller 102 to cooling roller 104 and from there exits the apparatus as a finished fabric 103. Heating roller 102 is maintained at a temperature of approximately 177°C. At this temperature hot-melt adhesive lines 16a, 16b are melted to form a permanent bond between the sheer fabrics 72, 96 and vanes 10a. Cooling roller 104 is maintained at a temperature of approximately 49°C and sets the hot-melt adhesive bonds.

By running the three layers together around heating roller 102 at a temperature of 177°C, the sheer fabrics and vane material are actually heat set to their new size and configuration at a uniform temperature-size relationship. The fabrics will thus hold this new size relationship with respect to one another unless subjected again to a temperature of 177°C or greater. The temperatures which normally would be experienced by this type of window covering in use generally do not exceed a 82°C. Thus, the window covering according to the present invention will remain wrinkle-free at any normal use temperatures.

Most fabrics are run through a heat setting process which sets the fibers and locks them to size in order to prevent shrinkage when subjected to heat in their normal applications. The heat setting apparatus of the present invention allows this preheat setting to be eliminated, thus saving time and money in the fabric processing.

In order to ensure that a wrinkle-free final product emerges from heat setting assembly 100, PTFE coated fibre glass endless tension belts 106 and 108, are used. First belt 106 travels around heating roller 102 and idler 110 mounted on shaft 111. Second belt 108 travels around cooling roller 104, idler 112, mounted on shaft 114, and idler 101. Second belt 108 travels around heating roller 102 outside first belt 106, which in turn, travels for a short distance around cooling roller 104 outside second belt 108. The three-layer fabric sandwich is pressed between the first and second belts 106, 108 as it passes around heating and cooling rollers 102, 104. The first and second belts 106, 108 are maintained at a much greater tension than the sheer fabrics 72, 96 and vanes 10a as it passes therebetween. The tension in the belts has the effect of pressing together the belts around heating and cooling rollers 102, 104. This uniformly presses the finished fabric 103 as it is heat set and cooled, thus further eliminating the possibility for a wrinkled or warped final product.

Referring to Figure 2, the tensioning of belts 106 and 108 is controlled by pneumatic cylinders 120 and 122, provided in pairs on both sides of frame 14. Pneumatic cylinders 120 act on shaft 114 which carries idler 112 and thus control the tension in cooling belt 108. Pneumatic cylinders 122 act on shaft 111 on which idler 110 is mounted and thus control the tension in heating belt 106. Both of cylinders 120 can be seen in Figure 1. Slotted arms 121 and 123 ensure

alignment of shafts 114 and 111, respectively. Air supply to the cylinders is controlled by regulators 128 and 129. The unwind tension of sheer fabric supply rollers 74 and 97 is precisely controlled during bonding the vanes and heat setting the layers together by pneumatic brakes 124 and 125, which are regulated by regulators 126 and 127, respectively.

The rotation of heating and cooling rollers 102, 104 is linked by geared wheels 132 and 134 which are in turn driven by gears 136 and 138 linked to the drive system. Heating and cooling rollers 102, 104 are each preferably formed as a hollow aluminum cylinder and electric heating elements may be disposed around the internal diameter of the roller 102, while cooling roller 104 may be cooled by forced air convection or in larger rollers by liquid cooling passages formed in the roller.

Figures 9, 10 and 14 illustrate alternative embodiments of the heat setting apparatus according to the present invention. In Figure 9, first and second belts 106a and 108a are carried by rollers 115a and 110a and rollers 113a and 114a, respectively. Tension in belts 106a and 108a may be adjusted by the moving shafts 111a and 114a in the same manner as shafts 111 and 114, explained above. The sandwiched second sheer fabric 96 and first sheer fabric 72 having tack bonded vanes 10a then run between belts 106a and 108a. Heating is provided by hot plates 102a and cooling by cool plates 104a disposed inside each of the belts and biased against the belts and sandwiched layers by springs 116.

In the embodiment of Figure 10 belts 106a and 108a are arranged generally as shown in Figure 9. However, instead of hot plates 102a, a plurality of hot rollers 102b are disposed inside each belt 106a with the axes of the upper set of rollers offset between the axes of the lower set of rollers. The axes of the upper and lower sets are also located slightly closer together than the diameter of the rollers thus providing a slight wrap, preferably an arc of approximately 20°, of the belts around each roller, to create a uniform pressure on the sandwiched layers between belts 106a and 108a when tension is applied to the belts. Rollers arranged in the same manner as hot rollers 102b may be used as cooling rollers or cooling plates 104a may be employed.

In Figure 14, only one hot plate 102c and one cool plate 104c are disposed within endless belt 108a are employed. The hot plate 102c includes an air chamber 180 and a plurality of air bleed holes 182 are formed through hot plate 102c, to provide fluid communication from air chamber 180 to the upper surface of hot plate 102c. Similarly, cool plate 104c includes an air chamber 184 and a plurality of air bleed holes 186. Air plenums 188, 190 are disposed within endless belt 106a opposite the hot and cool plates 102c and 104c, respectively. Each of the air plenums 188, 190 is provided with flexible seals 198 around the lower edge

thereof adjacent endless belt 106a. Preferably, the hot plate 102c and the cool plate 104c are wider than the belts 106, 108a and the air plenums 188, 190 are narrower than the plates and the belts.

Air is supplied to air plenum 188 and air chamber 180 of the hot plate 102a by hot air blower 192, for example, at a pressure of about 0.20 to 0.27 bar and a temperature of about 177 to 204°C to air plenum 188 through conduit 193 and to air chamber 180 through conduit 194. Hot plate 102c is also heated to a temperature of about 177°C by suitable means. Air is supplied, for example, at a pressure of about 0.20 to 0.27 bar and ambient temperature by cool air blower 195 through conduit 196 to air chamber 184 and through conduit 197 to air plenum 190 and cool plate 104c is cooled to a temperature of about 49°C or lower, by suitable means such as water cooling.

Air pressure in plenums 188, 190 biases the belts 106a, 108a, and the fabric sandwich 103 therebetween, toward the hot plate 102c and the cool plate 104c. In contrast to the embodiments of Figures 3, 9 and 10, in the embodiment of Figure 14 the tension in the belts 106a, 108a is not critical. In this embodiment, the pressure applied to the fabric sandwich 103 between the belts 106a, 108a is created by air pressure instead of tension, and uniformly presses the finished fabric 103 as it is heat set and cooled. Pressurized air flowing through the air bleed holes 182, 186 lifts the belt 108a off the hot and cool plates, preferably 0.05 mm to 0.2 mm, to minimize friction between the belt 108a and the plates to ensure uniform heating and cooling of the fabric sandwich 103.

After the finished fabric 103 exits the apparatus as shown in Figure 3, it can be wound up in a roll for storage and subsequent processing into a finished window covering, or the finished fabric 103 can be immediately transported to trim its lateral edges and/or to cut it into desired lateral widths. As shown in Figure 11, a hot knife cutting assembly 300 comprises a moving carriage 302 movably mounted on rails 304. A hot wheel knife cutter 306 is rotatably mounted on carriage 302 and rotates in the direction indicated by arrow 308. A shoe 312 carried by the moving carriage 302 holds the finished fabric 103 flat on a table 314 until the fabric 103 is cut by knife 306. Depending upon the material of the first sheer fabric, the second sheer fabric and vanes of the finished fabric 103, it may be possible to carefully control the temperature of the hot wheel knife 306 to prevent sealing of the lateral, cut edges of the three layers of the finished fabric 103 to one another. However, preferably, air supplied from a jet 310 mounted on the moving carriage 302 blows onto the edge of the cut fabric 103 immediately after the cutting, and lifts and opens the lateral edges of the fabric 103 to prevent the edges of the fabric from sealing together. Instead of the air jet 310, other suitable means, e.g. mechanical opening means, could be used for this purpose.

The hot knife cutting assembly 300 may be employed to cut to the finished fabric 103 immediately after the finished fabric 103 has been produced, and prior to winding the finished fabric 103 into a roll for storage, or could be used at a subsequent time or a different physical location.

Figures 6 and 7 illustrate a fabric light control window covering according to the present invention. Figure 6 illustrates the window covering in a fully open, light admitting position. In this position, each vane 10a has a central portion 140 which is substantially perpendicular to first and second sheer fabrics 72, 96. Edge portions 142 of the vane 10a, which are bonded to the sheer fabrics are connected to central portion 140 by a portion 141 having a smoothly curving shape. The adhesive bonding process of the present invention allows portion 141 to be formed without creases or sharp folds. The smoothly curved nature of this portion, in the fully open position, allows the vane to retain its resiliency and thus tends to bias the sheer fabrics into a closed or drawn together position. This ensures that the window covering does not lose its shape over time from repeated opening and closing. Furthermore, creases along vanes 10a can develop into failure points due to repeated bending inherent in the opening and closing of the window covering.

Figure 7 illustrates a possible method of deployment of a light control window covering according to the present invention. The window covering 150 is mounted on a head roller 152. The bottom of the first sheer fabric 72 may be provided with decorative stiffener 154. Second sheer fabric 96 is weighted by weight 153. Rotation of head roller 152 causes relative movement between first and second sheer fabrics 72, 96 in a vertical direction and thus an angular change in the orientation of vanes 10a to let in or block out light as desired. First sheer fabric 72 need not be weighted because of the tendency to close imparted by the biasing effect of vanes 10a.

With such window coverings, sheer woven fabrics having small interstices between the fibers each provide a pleasant and desirable appearance. However, when the same or very similar materials are used for the first and second sheer fabrics, a moire pattern is created by the overlying fabrics. This moire effect can be eliminated, according to the present invention, by providing first and second sheer woven or knit fabrics of materials having differently sized, shaped and/or oriented interstices. Alternatively, the moire effect can be avoided by using a non-woven sheer material as one or both of the first and second fabrics or by using a transparent plastic material as one or both of the first and second fabrics.

To avoid the undesirable moire effect the first and second sheer fabrics must have different appearances when viewed perpendicular to the planes of the sheer fabrics 72, 96. The required difference in ap-

pearance can be achieved in several different ways.

The first sheer fabric 72 can be a woven or knit fabric having interstices of one shape and the second sheer fabric can be a woven or knit material having interstices of a second shape. In one such embodiment shown in Figure 7, the second woven fabric 96 has small square interstices and the first sheer fabric 72 may have fibers forming interstices which are smaller, the same size or larger but positioned as diamonds with respect to the second sheer fabric 96.

In the second embodiment of Figure 6, the moire pattern may be avoided by providing a second sheer fabric 96 which has interstices which are smaller than those of first sheer fabric 72 without regard to the relative orientation or shape of the interstices, thereby preventing interference leading to a moire effect. In practice, the first and second fabrics are selected so that the width of the interstices of the first fabric is far greater than that of the interstices of the second fabric.

It is also possible to use the same woven fabric for both the first and second sheer fabrics 72, 96, if the two fabrics are oriented differently. In Figure 7, the woven fabrics 72 and 96 are the same and have square interstices, but the orientation of the woven fabrics differs by 45° to provide the diamond shaped interstices of the first sheer fabric 72. This is achieved by cutting one of the sheer fabrics on the bias.

It is also possible to avoid the moire effect and provide the required difference in appearance by using a non-woven sheer material, such as a plastic material, which may or may not be transparent, for one of the sheer fabrics and a woven sheer material for the other of the sheer fabrics of the window covering. Alternatively, non-woven sheer materials, such as the same or different plastic materials, can be used for both the first and second sheer fabrics.

In another embodiment of the present invention, the second sheer fabric 96 is replaced by a series of sheer fabric strips or a series of strings. A window covering of this embodiment can be made by the same process and apparatus as described above, however a series of parallel sheer fabric strip or parallel strings are fed to the apparatus from an appropriate supply roll instead of the second sheer fabric 96. The use of a series of strings or sheer fabric strips can provide a more "see-through" effect when the window covering is in the open position. However, because the overlapping configuration of the vanes is the same as that of a window covering having a second sheer fabric 96, in the closed position a window covering comprising a plurality of strings or sheer fabric strips provides the same light blocking effect.

To achieve the gently curved structure of the vanes 10a shown in Figure 6, the vane material must have a certain degree of softness. As a general principle, the wider the vanes 10a, the stiffer the vane material can be. However, since a broad range of

vane widths may be employed in window coverings in accordance with the present invention, it is difficult precisely to define an acceptable softness or stiffness range for the vane material:

A simple and effective physical test has been devised to determine whether a particular fabric is suitable for vanes having a specific vane width. The fabric being tested is allowed to hang over the edge of a table such that the distance from the edge of the fabric to the table top equals the desired vane width. If this does not hang substantially vertically, the fabric is too stiff to produce 50 mm wide vanes having the gently curved appearance of Figure 6.

Stiffer fabrics, i.e., those which do not hang substantially vertically over a table edge at the length of the desired vane width, can also be used, but longitudinally extending hinge or flex points are then preferably provided along the edges of the vanes. The use of a stiffer fabric provided with hinge points produces a window covering having a somewhat different appearance as shown in Figures 12 and 13. In Figure 12, vanes 210a have a straighter appearance and have a sharp bend at the hinge points 212 and 214, rather than a gently curving portion 141 as shown in Figure 6. The hinge points 212, 214 are provided by score-compressing a stiff vane material along parallel lines spaced sufficiently from the longitudinal edges of the vane material to allow the adhesive lines 16a, 16b to be applied between the longitudinal edge and the score-compressed line.

A structure similar to that shown in Figure 12 can also be produced using a relatively soft vane material, if desired, with a stiffening agent printed onto the central portion thereof to provide flatter vanes. The longitudinal edges of the vane material are left free of stiffening agent and the required hinge points are formed at the longitudinally extending edges of the printed on stiffening agent, with adhesive lines applied to the longitudinal edge portions left free of stiffening agent.

If desired, the vanes may be formed of a black-out laminate material to maximize the room darkening effect when the vanes are oriented in the closed position. A suitable black-out laminate material is a three ply laminate comprising a polyester film such as MYLAR sandwiched between two layers of a spun bonded or spun laced polyester non-woven material. Such a three ply laminate has, by virtue of its construction, a greater stiffness than most single ply materials. Accordingly, score-compressed hinge points, such as those shown in Figure 12, could be provided in the black-out laminate vane material if necessary.

Alternatively, to produce a window covering of the present invention having a maximized room darkening effect, only a stiffened central portion of the vanes is formed from a black-out laminate material. The longitudinal edges of the vanes are left free of the black-out laminate to provide the required hinge points and flexibility along the edges of the vanes.

When the black-out laminate is provided only on the central portion of the vanes, it is desirable to space the vanes closer together than described above in order to ensure that the black-out laminated central portions overlap when the window covering is closed, for maximum room darkening effect. For example, for a 635 mm wide vane with a 38 mm wide black-out laminated central portion, the overlap of the vanes is preferably about 32 mm.

Another possible vane material is vinyl or a laminate of a non-woven material and a vinyl material, which generally provides an increased room darkening effect but are soft enough that score-compressed hinge points are not required. Of course, score-compressed hinge points could be provided if necessary.

When a non-woven fabric is used for the vane material, the problem of a moire effect in the window covering when it is closed is avoided. In some instances, however, it may be desirable to use a woven or knit material for the vane material. A basic woven material will give a moire effect because this type of material has a very ordered orthogonal surface structure. To avoid a moire effect when the window covering having a woven or knit vane material is in the closed position, a crepe woven vane material can be used because materials have a much more randomly oriented surface structure. Alternatively, the surface of the woven or knit material can be altered to randomize the surface fibers, for example, by sanding, napping or calendarizing.

Window coverings having first and second sheer fabrics and vanes of various colours, and combinations of colours are contemplated. For example, to provide a more transparent window covering in the open position, dark sheer material can be used for the first and second sheer fabrics because dark colours reflect less light than lighter colours. Similarly, white or light coloured sheer materials provide a more translucent effect when the window covering is open.

The vanes may be the same colour or a different colour than the first and second sheer fabrics. A problem of glue line show-through has been experienced, however, when the vane material is a dark colour and the first and second sheer fabrics are of a considerably lighter colour or white. To overcome this a small amount of whitener, such as titanium dioxide, about 0.5 to 1.0% by weight, is added to the adhesive before it is applied to the vane material.

Claims

1. A light control window covering comprising a first relatively translucent sheet (72) of material, a second relatively translucent sheet (96) of material, disposed parallel to said first sheet, a plurality of strips (10a, 210a) of relatively opaque mate-

rial, each having edge portions, and said strips having their edge portions bonded to said first sheet (72) and said second sheet (96), respectively, whereby central portions of said strips form vanes which, in a first closed position of said window covering are substantially planar and extend substantially parallel to the first and second sheets (72, 96) effective at least partially to block transmission of light and, in a second position of said window covering extend generally transverse to said first and second sheets, effective to transmit light between said vanes, characterised in that one of said first and second sheets (72, 96) is an open fabric having threads defining interstices therebetween and the other of said sheets is either a non-woven sheer material, such as a plastics material or an open sheer fabric having threads defining interstices therebetween, the interstices of one sheet being of a different size and/or shape and/or of a different orientation from those of the other sheet, whereby the appearance of a moire effect is avoided when light is viewed through both of the fabric sheets (72, 96).

2. A window covering according to claim 1, characterised in that in said first closed portion, adjacent vanes overlap.
3. A window covering according to claim 1 or 2, characterised in that the edge portions of the strips are adhesively bonded to the first and second sheets by means of an adhesive (16a, 16b).
4. A window covering according to any preceding claim, characterised in that the strips are formed of a fabric having threads defining interstices therebetween, which are of a different size and/or shape and/or orientation from the interstices of said fabric sheet or sheets, whereby the appearance of a moire effect is avoided when said strips extend parallel thereto in the first closed portion of said window covering.
5. A window covering according to any preceding claim, characterised in that the portions of the strips between the bonded edge portions and the central portions form smoothly curving portions, when the window covering is in its second open position.
6. A window covering according to any preceding claim, characterised in that said strips are provided with reversely curving portions (141).
7. A window covering according to any preceding claim, characterised in that said strips have adequate resilience to bias said fabrics towards said first closed position.



When the black-out laminate is provided only on the central portion of the vanes, it is desirable to space the vanes closer together than described above in order to ensure that the black-out laminated central portions overlap when the window covering is closed, for maximum room darkening effect. For example, for a 635 mm wide vane with a 38 mm wide black-out laminated central portion, the overlap of the vanes is preferably about 32 mm.

Another possible vane material is vinyl or a laminate of a non-woven material and a vinyl material, which generally provides an increased room darkening effect but are soft enough that score-compressed hinge points are not required. Of course, score-compressed hinge points could be provided if necessary.

When a non-woven fabric is used for the vane material, the problem of a moire effect in the window covering when it is closed is avoided. In some instances, however, it may be desirable to use a woven or knit material for the vane material. A basic woven material will give a moire effect because this type of material has a very ordered orthogonal surface structure. To avoid a moire effect when the window covering having a woven or knit vane material is in the closed position, a crepe woven vane material can be used because materials have a much more randomly oriented surface structure. Alternatively, the surface of the woven or knit material can be altered to randomize the surface fibers, for example, by sanding, napping or calendarizing.

Window coverings having first and second sheer fabrics and vanes of various colours, and combinations of colours are contemplated. For example, to provide a more transparent window covering in the open position, dark sheer material can be used for the first and second sheer fabrics because dark colours reflect less light than lighter colours. Similarly, white or light coloured sheer materials provide a more translucent effect when the window covering is open.

The vanes may be the same colour or a different colour than the first and second sheer fabrics. A problem of glue line show-through has been experienced, however, when the vane material is a dark colour and the first and second sheer fabrics are of a considerably lighter colour or white. To overcome this a small amount of whitener, such as titanium dioxide, about 0.5 to 1.0% by weight, is added to the adhesive before it is applied to the vane material.

Claims

1. A light control window covering comprising a first relatively translucent sheet (72) of material, a second relatively translucent sheet (96) of material, disposed parallel to said first sheet, a plurality of strips (10a, 210a) of relatively opaque mate-

rial, each having edge portions, and said strips having their edge portions bonded to said first sheet (72) and said second sheet (96), respectively; whereby central portions of said strips form vanes which, in a first closed position of said window covering are substantially planar and extend substantially parallel to the first and second sheets (72, 96) effective at least partially to block transmission of light and, in a second position of said window covering extend generally transverse to said first and second sheets, effective to transmit light between said vanes, characterised in that one of said first and second sheets (72, 96) is an open fabric having threads defining interstices therebetween and the other of said sheets is either a non-woven sheer material, such as a plastics material or an open sheer fabric having threads defining interstices therebetween, the interstices of one sheet being of a different size and/or shape and/or of a different orientation from those of the other sheet, whereby the appearance of a moire effect is avoided when light is viewed through both of the fabric sheets (72, 96).

2. A window covering according to claim 1, characterised in that in said first closed portion, adjacent vanes overlap.
3. A window covering according to claim 1 or 2, characterised in that the edge portions of the strips are adhesively bonded to the first and second sheets by means of an adhesive (16a, 16b).
4. A window covering according to any preceding claim, characterised in that the strips are formed of a fabric having threads defining interstices therebetween, which are of a different size and/or shape and/or orientation from the interstices of said fabric sheet or sheets, whereby the appearance of a moire effect is avoided when said strips extend parallel thereto in the first closed portion of said window covering.
5. A window covering according to any preceding claim, characterised in that the portions of the strips between the bonded edge portions and the central portions form smoothly curving portions, when the window covering is in its second open position.
6. A window covering according to any preceding claim, characterised in that said strips are provided with reversely curving portions (141).
7. A window covering according to any preceding claim, characterised in that said strips have adequate resilience to bias said fabrics towards said first closed position.



8. A window covering according to any preceding claim, characterised in that one face of each vane is bonded to the first sheet and the opposite face of each vane is bonded to the second sheet. 5
9. A light control window covering comprising a first relatively translucent sheet (72) of material, a second relatively translucent sheet (96) of material, disposed parallel to said first sheet and a plurality of strips (10a, 210a) of relatively opaque material, each having edge portions (16a, 16b) bonded to said first sheet (72) and said second sheet (96), respectively, whereby central portions of said strips form vanes which, in a first closed position of said window covering are substantially planar and extend substantially parallel to the first and second sheets (72, 96) effective at least partially to block transmission of light and, in a second open position of said window covering, extend generally transverse to said first and second sheets, effective to transmit light between said vanes, characterised in that the central portions of the strips (10a, 210a) between the bonded edge portions (142) are smoothly and reversely curving portions (141), when the window covering is in its second open position and said strips have adequate resilience to tend to bias said sheets towards said first closed position. 10 15 20 25
10. A light control window covering according to claim 9, characterised in that one face of each vane is bonded to the first sheet and the opposite face of each vane is bonded to the second sheet. 30
11. A light control window covering according to claim 9 or 10, characterised in that in said first closed position adjacent vanes overlap. 35
12. A light control window covering according to any one of claims 9 to 11, characterised in that the window covering further comprises an adhesive for bonding said edge portions to said first sheet and said second sheet. 40 45
13. A light control window covering according to any preceding claim, characterised in that said sheets are open knitted or woven fabrics. 50
14. A method for manufacturing a fabric light control window covering, comprising providing first and second wide relatively translucent sheets (72, 96) of sheer material of the same given width, feeding longitudinally a narrow strip of relatively opaque material (10), cutting the strip material into individual lengths (10a) substantially equal to said given width of first and second sheets (72, 96), said strip material having first and second edges and first and second sides; positioning the first side of the cut lengths of narrow strip material along the first edge against the first sheet material; positioning said second wide sheet material (96) to contact the second side of the individual lengths of narrow strip material and bonding together the first wide sheet material (72), the individual lengths (10a) of narrow strip material and second wide sheet material (96) to form a bonded sandwich in which the first and second wide sheet (72, 96) materials are movable relative to each other in a direction perpendicular to the individual lengths (10a) of narrow strip material, characterised by the steps of applying a first adhesive line (16a) longitudinally to the narrow strip material adjacent the first edge on the first side; applying a second adhesive line (16b) longitudinally to the narrow strip material adjacent the second edge on the second side; disposing said first wide sheet material (72) with its longitudinal axis perpendicular to the axes of said narrow strip material (10a) and pressing together the first wide sheet material (72), the individual lengths (10a) of narrow strip material and the second wide sheet material (96) to form said bonded sandwich. 55
15. A method according to claim 14, characterised in that the adhesive is a hot-melt adhesive which hardens after application and before subsequent processing steps, and said method further comprises heating the first wide sheet material (72) just prior to positioning along the first side of the narrow strip material to it in order to form a tack bond with the first line of hot-melt adhesive. 60
16. A method according to claim 14 or 15, characterised in that the first and second wide sheet materials (72, 96) are fed at equal constant rates; and a portion of the first wide sheet material (72) is momentarily stopped to press on the individual length (10a) of narrow strip material without smearing the adhesive line, said stopping occurring while continuing to feed the first and second wide sheet material at said equal constant rates. 65
17. A method according to claim 14, characterised in that the stopped portion of said first sheet material is moved forward a first distance and the stopped portion of said first sheet material is then moved backward a second distance, said first distance being greater than said second distance and said first distance being greater than the width of said cut strips. 70
18. A method according to claim 14, 15 or 16, further comprising heat setting said sandwich, under uniform tension and pressure, said heat setting comprising passing said sandwich between two belts 75



- (106,106a,108,108a); and running said sandwich, between said belts, over a hot surface (102,102b,102c).
19. A method according to claim 18, further comprising cooling said sandwich by running said sandwich between the belts over a cool surface (104,104c).
20. A method according to claim 19, characterised in that said hot and cool surfaces are rollers or plates.
21. A method according to claim 19 or 20, characterised in that the temperature of the hot surface is about 177° C; and the temperature of the cool surface is below about 49° C.
22. A method according to claim 19, 20 or 21, characterised in that the hot surface is a first flat plate (102c) and said cool surface is a second flat plate (104c) and wherein said sandwich is maintained under uniform pressure by air pressure.
23. A method according to any one of claims 17 to 22, characterised in that the first and second wide sheet materials are fed at equal first tensions and in that said belts are tension belts having an applied tension greater than said first tension in the first and second wide sheet materials.
24. A method according to claim 15, characterised in that the hot-melt adhesive is initially melted in a small quantity, said small quantity being an amount sufficient for even application without yellowing due to prolonged exposure to melting temperatures.
25. A method according to any one of claims 14 to 24, characterised in that the cut length of narrow strip material bonded to the first wide sheet material is forced out of the way of a next cut length of narrow strip material to be bonded to the first wide sheet material by air jets.
26. A method according to claim 25, characterised in that the successive cut lengths of narrow strip material are separated after cutting by acceleration.
27. Apparatus for fabricating a light control window covering, comprising means (12) for continuously feeding a narrow strip material (10) longitudinally at a first rate, means (74,97) for continuously feeding first and second wide sheet materials (72,96) at a second rate longitudinally in a direction perpendicular to said strip material longitudinal direction; means (98-108) for forming a bond-

ed sandwich comprising three layers, said layers being the narrow strip material (10) between the first and second wide sheet materials (72,96); characterised in that said means for forming a bonded sandwich comprise means (21-34) for applying adhesive to the narrow strip material in two lines, a first said line (16a) being applied adjacent a first edge on a first side of said material and a second said line (16b) being applied adjacent a second edge on a second side of said material; means (40) for cutting the narrow strip material (10) into plural individual strips (10a) of a length equal to the width of said wide sheet materials (72,96); means (82) for uniformly pressing said individual strips (10a) against said first wide sheet material (72) transversely across the width of said sheet material to adhesively bond or tack bond said cut strips to said first sheet material; and means (79) for forcing said cut strips (10a), bonded or tack bonded to said first wide sheet material (72), out of the way of a cut strip to be subsequently pressed and bonded to said first sheet material; belts (106,108) between which the sandwich of layers is passed and heating and cooling surfaces (102,104) for successively heating and cooling the belts for setting the sandwich of layers at a uniform temperature-size relationship with respect to each other.

28. Apparatus according to claim 27, characterised in that the forming means further comprises means (76,84) for positioning said first wide sheet material with respect to said cut strips to provide for overlapping arrangement of said cut strips bonded to said wide sheet material.

29. Apparatus according to claim 27 or 28, characterised in that the adhesive applying means comprises spaced first and second nozzles (21); spaced first and second backup roller (23) spaced from said first and second nozzles, respectively, said backup rollers being adjustably mounted for varying the spacing between said rollers and their respective nozzles; and pump means (34) for providing adhesive to said nozzles at a rate proportional to the feeding of said narrow strip material, whereby said narrow strip material passes around the first backup roller adjacent the first nozzle, at which point said first nozzle applies an adhesive line adjacent the first edge on the first side of said strip material, and said narrow strip material passes around the second backup roller adjacent the second nozzle, at which point said second nozzle applies an adhesive line adjacent the second edge on the second side of said strip material.

30. Apparatus according to claim 29, characterised in



that the adhesive applying means further comprises a heating block (35) for melting hot-melt adhesive, said heating block containing said pump means and said nozzles (21) being mounted on said heating block (35) in a heat transferring manner, whereby said nozzles are maintained at the same temperature as said heating block; and means (34) for forcing solid hot-melt adhesive into the heating block in controlled quantities small enough to prevent yellowing of the melted adhesive while maintaining an even adhesive flow.

31. Apparatus according to any one of claims 27 to 30, characterised in that the pressing means comprises a narrow rigid member (82) mounted on means (83) for applying linear force and disposed parallel to and on the opposite side of said individual strips from said the first wide sheet material; and means (80) for sensing alignment of a cut end of said individual strips with an edge of said first wide sheet material, said sensing means cooperating with said force applying means (83) to activate said force applying means when said alignment is sensed, whereby said rigid member (82) presses the aligned individual strip against the first wide sheet material.

32. Apparatus according to claim 28, characterised in that the positioning means comprises first and second dancer rollers (76,84) rotatably mounted on first and second arms (89,85), respectively, said arms being fixed to first and second dancer shafts (88,87), respectively, said first wide sheet material (72) passing around said rollers (76,84) with said first roller located before said pressing means (82) and said second roller located after said pressing means with respect to the direction of feeding the first wide sheet material; a linkage comprising a first drive arm (90) fixed to said first dancer shaft (88), a second drive arm (91) fixed to said second dancer shaft (87), a connecting rod (91) linking said drive arms, and a frame (14) supporting said dancer shafts; cam means (93) for driving said linkage wherein said cam means is shaped to hold stationary a portion of said first wide sheet material (72) adjacent said pressing means (82) as said individual strip (10a) is pressed and bonded or tack bonded, to move said portion ahead at a rate greater than the second feed rate for a distance greater than the overlapping relationship and then to move said portion back to position said first wide sheet material over said pressing means (82) for the pressing of the next subsequent individual strip (10a); and spring means (94) for biasing said linkage against said cam means.

33. Apparatus according to any one of claims 27 to 32, characterised in that the forcing means comprises air jets (79) positioned to blow air over the individual strips (10a) pressed and bonded to said first wide sheet material (72), whereby said individual strips are forced out of the way of subsequently pressed and bonded individual strips.

34. Apparatus according to any one of claims 27 to 33, further comprising means (60) for spacing apart said individual strips after cutting, said spacing means comprising an endless belt (62) disposed perpendicular to said wide sheet materials and in-line with said individual strips, immediately below said cutting means (40), said endless belt having a plurality of holes extending therethrough; a drive wheel (61) and idler roller (63) supporting said endless belt, said wheel driving said belt at a speed greater than said first rate of said narrow strip material; a hollow support structure (64) extending between said wheel and idler (61,63) said structure opening to one side along its length and said endless belt riding sealingly along said open side; means (69) for evacuating said hollow support structure (64) and drawing air through said holes in the endless belt (62) to pull individual strips (100) against said belt; and nip means (65) for pressing said individual strips (10a) against said endless belt (62), said nip means cooperating with said cutting means (40) to act only at the time of cutting, whereby said narrow strip material passing through said cutting means is pulled against the endless belt in sliding contact, and when said cutting means cuts an individual strip, said individual strip is pulled against said endless belt and spaced away from the uncut narrow strip material.

35. Apparatus according to any one of claims 27 to 34, further comprising means (78) for heating said first wide sheet material before pressing and bonding or tack bonding said cut strip to said first wide sheet material.

36. Apparatus according to any one of claims 27 to 35, characterised in that the setting means comprises a first endless belt (106); a second endless belt (108); a hot roller (102) enclosed within said first endless belt; and a cool roller (104) enclosed within said second endless belt; wherein said first belt (106) is pulled tightly against the hot roller (102) and said second belt (108) is pulled tightly against said first belt around a portion of the hot roller, and said second belt (108) is pulled tightly against the cool roller (104) and said first belt is pulled tightly against said second belt around a portion of the cool roller, whereby said sandwich



may be passed between said belts and around said rollers to first heat and then cool said sandwich under uniform pressure due to tension induced in said belts.

37. Apparatus according to any one of claims 27 to 35, characterised in that the setting means comprises a first endless belt (106a); a second endless belt (108a) disposed adjacent to said first belt over a portion of their length: means (102a, 102c) for heating said belts over a first part of the adjacent portion; means (104a, 104c) for cooling said belts over a second part of the adjacent portion; and means (116, 192, 195) for applying pressure to said sandwich when passed between said belts, whereby said sandwich may be passed between said belts and successively heated and cooled.
38. Apparatus according to claim 37, characterised in that the heating means includes at least one hot plate and wherein said cooling means includes at least one cool plate.
39. Apparatus according to claim 38, characterised in that means for applying pressure to said sandwich comprises a first air plenum (180) located opposite said hot plate, a second air plenum (184) located opposite said cool plate, a first air blower (192) for supplying pressurized air to said first air plenum, and a second air blower (195) for supplying pressurized air to said second air plenum, wherein pressurized air in said first and second air plenums biases said belts toward said hot plate and said cool plate, respectively.

Patentansprüche

1. Fensterabdeckung zur Regulierung des Lichteinfalls mit einer ersten relativ lichtdurchlässigen Materiallage (72), einer zweiten relativ lichtdurchlässigen Materiallage (96), die parallel zur ersten Lage angeordnet ist, einer Vielzahl von Streifen (10a, 210a) aus relativ lichtundurchlässigem Material, die jeweils Randabschnitte aufweisen und deren Randabschnitte mit der ersten Lage (72) und der zweiten Lage (96) verbunden sind, wobei mittlere Abschnitte der Streifen Flügel bilden, die in einer ersten geschlossenen Position der Fensterabdeckung im wesentlichen planar sind und sich im wesentlichen parallel zur ersten und zweiten Lage (72, 96) erstrecken sowie zumindest teilweise das Hindurchtreten von Licht blockieren können, und die sich in einer zweiten Position der Fensterabdeckung allgemein quer zur ersten und zweiten Lage erstrecken und Licht zwischen den Flügeln hindurchlassen können, dadurch ge-

kennzeichnet, daß eine der ersten und zweiten Lagen (72, 96) ein offenes textiles Material mit Fäden ist, die dazwischen Lücken bilden, und daß die andere Lage entweder ein nicht gewebtes durchscheinendes Material, wie beispielsweise ein Kunststoff, oder ein offenes durchscheinendes textiles Material mit Fäden ist, die dazwischen Lücken bilden, wobei die Lücken der einen Lage eine andere Größe und/oder Form und/oder eine andere Orientierung besitzen als die der anderen Lage, so daß das Auftreten eines Moiré-Effektes vermieden wird, wenn Licht durch beide Lagen (72, 96) aus textilem Material gesehen wird.

2. Fensterabdeckung nach Anspruch 1, dadurch gekennzeichnet, daß sich in der ersten geschlossenen Position benachbarte Flügel überlappen.
3. Fensterabdeckung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Randabschnitte der Streifen mit Hilfe eines Klebers (16a, 16b) mit der ersten und zweiten Lage verklebt sind.
4. Fensterabdeckung nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die Streifen aus einem textilen Material mit Fäden gebildet sind, die Lücken dazwischen vorsehen, welche eine andere Größe und/oder Form und/oder Orientierung haben als die Lücken der Lage oder Lagen aus textilem Material, wodurch das Auftreten eines Moiré-Effektes vermieden wird, wenn sich die Streifen in der ersten geschlossenen Position der Fensterabdeckung parallel dazu erstrecken.
5. Fensterabdeckung nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die Abschnitte der Streifen zwischen den verbundenen Randabschnitten und den mittleren Abschnitten stetig gekrümmte Abschnitte bilden, wenn sich die Fensterabdeckung in ihrer zweiten offenen Position befindet.
6. Fensterabdeckung nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die Streifen mit entgegengesetzt gekrümmten Abschnitten (141) versehen sind.
7. Fensterabdeckung nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die Streifen eine angemessene Elastizität besitzen, um die Gewebe in Richtung auf die erste geschlossene Position vorzuspannen.
8. Fensterabdeckung nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß ei-



ne Seite eines jeden Flügels mit der ersten Lage und die gegenüberliegende Seite eines jeden Flügels mit der zweiten Lage verbunden ist.

9. Fensterabdeckung zur Regulierung des Lichteinfalls mit einer ersten relativ lichtdurchlässigen Materiallage (72), einer zweiten relativ lichtdurchlässigen Materiallage (96), die parallel zur ersten Lage angeordnet ist, und einer Vielzahl von Streifen (10a, 210a) aus relativ lichtundurchlässigem Material, die jeweils Randabschnitte (16a, 16b) aufweisen, die mit der ersten Lage (72) und der zweiten Lage (96) verbunden sind, wobei mittlere Abschnitte der Streifen Flügel bilden, die in einer ersten geschlossenen Position der Fensterabdeckung im wesentlichen planar sind und sich im wesentlichen parallel zur ersten und zweiten Lage (72, 96) erstrecken sowie zumindest teilweise das Hindurchtreten von Licht blockieren können, und die sich in einer zweiten offenen Position der Fensterabdeckung allgemein quer zur ersten und zweiten Lage erstrecken und Licht zwischen den Flügeln hindurchlassen können, dadurch gekennzeichnet, daß die mittleren Abschnitte der Streifen (10a, 210a) zwischen den verbundenen Randabschnitten (142) stetig und entgegengesetzt gekrümmte Abschnitte (141) sind, wenn sich die Fensterabdeckung in ihrer zweiten offenen Position befindet, und daß die Streifen eine ausreichende Elastizität besitzen, um die Lagen in Richtung auf die erste geschlossene Position vorzuspannen.
10. Fensterabdeckung nach Anspruch 9, dadurch gekennzeichnet, daß eine Seite eines jeden Flügels mit der ersten Lage und die gegenüberliegende Seite eines jeden Flügels mit der zweiten Lage verbunden ist.
11. Fensterabdeckung nach Anspruch 9 oder 10, dadurch gekennzeichnet, daß sich in der ersten geschlossenen Position benachbarte Flügel überlappen.
12. Fensterabdeckung nach einem der Ansprüche 9 bis 11, dadurch gekennzeichnet, daß die Fensterabdeckung des weiteren einen Kleber zum Verbinden der Randabschnitte mit der ersten Lage und der zweiten Lage umfaßt.
13. Fensterabdeckung nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß es sich bei den Lagen um offenes gewirktes oder gewebtes textiles Material handelt.
14. Verfahren zum Herstellen einer Fensterabdeckung aus textilem Material zur Regulierung des Lichteinfalls, die eine erste und zweite breite,

relativ lichtdurchlässige Lage (72, 96) aus durchscheinendem Material der gleichen vorgegebenen Breite aufweist, bei der ein schmaler Streifen aus relativ lichtundurchlässigem Material (10) in Längsrichtung geführt wird; das Streifenmaterial in einzelne Längen (10a) geschnitten wird, die im wesentlichen der vorgegebenen Breite der ersten und zweiten Lage (72, 96) entsprechen, wobei das Streifenmaterial einen ersten und zweiten Rand sowie eine erste und zweite Seite besitzt, die erste Seite der abgeschnittenen Längen des schmalen Streifenmaterials entlang dem ersten Rand gegen das erste Lagenmaterial gelegt wird, das zweite breite Lagenmaterial (96) so angeordnet wird, daß es mit der zweiten Seite der einzelnen Längen des schmalen Streifenmaterials in Kontakt tritt, und das erste breite Lagenmaterial (72), die einzelnen Längen (10a) des schmalen Streifenmaterials und das zweite breite Lagenmaterial (96) miteinander verbunden werden, um ein miteinander verbundenes Sandwich-Gebilde zu schaffen, bei dem das erste und zweite breite Lagenmaterial (72, 96) in einer Richtung senkrecht zu den einzelnen Längen (10a) des schmalen Streifenmaterials relativ zueinander beweglich sind, gekennzeichnet durch die folgenden Schritte: Aufbringen einer ersten Klebelinie (16a) in Längsrichtung auf das schmale Streifenmaterial benachbart zum ersten Rand auf der ersten Seite, Aufbringen einer zweiten Klebelinie (16b) in Längsrichtung auf das schmale Streifenmaterial benachbart zum zweiten Rand auf der zweiten Seite, Anordnen des ersten breiten Lagenmaterials (72) derart, daß seine Längsachse senkrecht zu den Achsen des schmalen Streifenmaterials (10a) verläuft, und Zusammenpressen des ersten breiten Lagenmaterials (72), der einzelnen Längen (10a) des schmalen Streifenmaterials und des zweiten breiten Lagenmaterials (96), um das miteinander verbundene Sandwich-Gebilde herzustellen.

15. Verfahren nach Anspruch 14, dadurch gekennzeichnet, daß es sich bei dem Kleber um einen Heißschmelzkleber handelt, der nach dem Aufbringen und vor nachfolgenden Verfahrensschritten aushärtet, und daß das Verfahren des weiteren das Erhitzen des ersten breiten Lagenmaterials (72) unmittelbar vor der Anordnung entlang der ersten Seite des schmalen Streifenmaterials daran umfaßt, um eine Haftbindung mit der ersten Linie des Heißschmelzklebers auszubilden.
16. Verfahren nach Anspruch 14 oder 15, dadurch gekennzeichnet, daß das erste und zweite breite Lagenmaterial (72, 96) mit gleicher konstanter Geschwindigkeit zugeführt wird und daß ein Abschnitt des ersten breiten Lagenmaterials (72)



- für einen Augenblick gestoppt wird, um die einzelne Länge (10a) des schmalen Streifenmaterials ohne Verschmieren der Klebelinie aufzupressen wobei der Stoppvorgang durchgeführt wird, während das erste und zweite breite Lagenmaterial weiterhin mit der gleichen konstanten Geschwindigkeit zugeführt wird.
17. Verfahren nach Anspruch 14, dadurch gekennzeichnet, daß der gestoppte Abschnitt des ersten Lagenmaterials um eine erste Strecke nach vorne und der gestoppte Abschnitt des ersten Lagenmaterials dann eine zweite Strecke nach hinten bewegt wird, wobei die erste Strecke größer ist als die zweite Strecke und größer ist als die Breite der abgeschnittenen Streifen.
18. Verfahren nach Anspruch 14, 15 oder 16, das des weiteren das Heißfixieren des Sandwich-Gebildes unter gleichmäßigem Zug und Druck umfaßt, wobei beim Heißfixieren das Sandwich-Gebilde zwischen zwei Bänder (106, 106a, 108, 108a) und zwischen den Bändern über eine heiße Fläche (102, 102b, 102c) geführt wird.
19. Verfahren nach Anspruch 18, bei dem des weiteren das Sandwich-Gebilde gekühlt wird, indem es zwischen den Bändern über eine kalte Fläche (104, 104c) geführt wird.
20. Verfahren nach Anspruch 19, dadurch gekennzeichnet, daß die heiße und kalte Fläche durch Rollen oder Platten gebildet werden.
21. Verfahren nach Anspruch 19 oder 20, dadurch gekennzeichnet, daß die Temperatur der heißen Fläche etwa 177°C beträgt und die Temperatur der kalten Fläche unter etwa 49°C liegt.
22. Verfahren nach Anspruch 19, 20 oder 21, dadurch gekennzeichnet, daß es sich bei der heißen Fläche um eine erste ebene Platte (102c) und bei der kalten Fläche um eine zweite ebene Platte (104c) handelt und daß das Sandwich-Gebilde durch Luftdruck unter gleichmäßigem Druck gehalten wird.
23. Verfahren nach einem der Ansprüche 17 bis 22, dadurch gekennzeichnet, daß das erste und zweite breite Lagenmaterial mit einer gleichen ersten Zugkraft zugeführt werden und daß die Bänder Zugbänder sind, die eine Zugkraft aufbringen, die größer ist als die erste Zugkraft im ersten und zweiten breiten Lagenmaterial.
24. Verfahren nach Anspruch 15, dadurch gekennzeichnet, daß der Heißschmelzkleber anfangs in einer kleinen Menge geschmolzen wird, die für eine gleichmäßige Aufbringung ausreichend groß ist, ohne wegen einer zu langen Einwirkung der Schmelztemperaturen zu vergilben.
25. Verfahren nach einem der Ansprüche 14 bis 24, dadurch gekennzeichnet, daß die abgeschnittene Länge des schmalen Streifenmaterials, die mit dem ersten breiten Lagenmaterial verbunden ist, mit Hilfe von Luftströmen aus dem Wege einer nächsten abgeschnittenen Länge von schmalen Streifenmaterial, die mit dem ersten breiten Lagenmaterial verbunden werden soll, herausgeführt wird.
26. Verfahren nach Anspruch 25, dadurch gekennzeichnet, daß die aufeinanderfolgenden abgeschnittenen Längen des schmalen Streifenmaterials nach dem Schneidvorgang durch Beschleunigung voneinander getrennt werden.
27. Vorrichtung zum Herstellen einer Fensterabdeckung zur Regulierung des Lichteinfalls mit Einrichtungen (12) zum kontinuierlichen Zuführen eines schmalen Streifenmaterials (10) in Längsrichtung mit einer ersten Geschwindigkeit, Einrichtungen (74, 97) zum kontinuierlichen Zuführen eines ersten und zweiten breiten Lagenmaterials (72, 96) mit einer zweiten Geschwindigkeit in Längsrichtung in einer Richtung senkrecht zur Längsrichtung des Streifenmaterials, Einrichtungen (98-108) zur Ausbildung eines miteinander verbundenen Sandwich-Gebildes, das drei Schichten umfaßt, bei denen es sich um das schmale Streifenmaterial (10) zwischen dem ersten und zweiten breiten Lagenmaterial (72, 96) handelt, dadurch gekennzeichnet, daß die Einrichtungen zum Herstellen eines miteinander verbundenen Sandwich-Gebildes Einrichtungen (21-34) zum Aufbringen von Kleber auf das schmale Streifenmaterial in zwei Linien, wobei eine erste Linie (16a) benachbart zu einem ersten Rand auf eine erste Seite des Materials und eine zweite Linie (16b) benachbart zu einem zweiten Rand auf eine zweite Seite des Materials aufgebracht wird, Einrichtungen (40) zum Schneiden des schmalen Streifenmaterials (10) in eine Vielzahl von einzelnen Streifen (10a) einer Länge, die der Breite der breiten Lagenmaterialien (72, 96) entspricht, Einrichtungen (82) zum gleichmäßigen Pressen der einzelnen Streifen (10a) gegen das erste breite Lagenmaterial (72) in Querrichtung über die Breite des Lagenmaterials zur Herstellung einer Klebeverbindung und einer Haftverbindung zwischen den abgeschnittenen Streifen und dem ersten Lagenmaterial, und Einrichtungen (79) zum Herausdrücken der abgeschnittenen Streifen (10a), die mit dem ersten breiten Lagenmaterial (72) verklebt sind



oder daran haften, aus dem Weg eines abgeschnittenen Streifens, der danach gegen das erste Lagenmaterial gepreßt und damit verbunden wird, und Bänder (106, 108), zwischen die das Sandwich-Gebilde aus den Schichten geführt sowie Heiz- und Kühlflächen (102, 104) zum nacheinander erfolgenden Erhitzen und Kühlen der Bänder, um das Sandwich-Gebilde aus den Schichten auf eine gleichmäßige Temperatur-Größen-Beziehung relativ zueinander einzustellen, umfassen.

28. Vorrichtung nach Anspruch 27, dadurch gekennzeichnet, daß die Einrichtungen zur Ausbildung des Sandwich-Gebildes des weiteren Einrichtungen (76, 84) zum Anordnen des ersten breiten Lagenmaterials relativ zu den abgeschnittenen Streifen derart, daß für eine überlappende Anordnung der mit dem breiten Lagenmaterial verbundenen abgeschnittenen Streifen gesorgt wird, umfassen.

29. Vorrichtung nach Anspruch 27 oder 28, dadurch gekennzeichnet, daß die Einrichtungen zum Aufbringen des Klebers beabstandete erste und zweite Düsen (21), beabstandete erste und zweite Stützrollen (23), die von der ersten und zweiten Düse beabstandet und verstellbar montiert sind, um den Abstand zwischen den Rollen und ihren entsprechenden Düsen zu verändern, und Pumpeinrichtungen (34) umfassen, um den Kleber mit einer Geschwindigkeit den Düsen zuzuführen, die proportional zur Zuführgeschwindigkeit des schmalen Streifenmaterials ist, wobei das schmale Streifenmaterial um die erste Stützrolle benachbart zur ersten Düse läuft, an welchem Punkt die erste Düse eine Klebelinie benachbart zum ersten Rand auf die erste Seite des Streifenmaterials aufbringt, und wobei das schmale Streifenmaterial um die zweite Stützrolle benachbart zur zweiten Düse läuft, an welchem Punkt die zweite Düse eine Klebelinie benachbart zum zweiten Rand auf die zweite Seite des Streifenmaterials aufbringt.

30. Vorrichtung nach Anspruch 29, dadurch gekennzeichnet, daß die Einrichtungen zum Aufbringen des Klebers des weiteren einen Heizblock (35) zum Schmelzen von Heißschmelzkleber, der die Pumpeinrichtungen enthält, wobei die Düsen (21) in einer wärmeübertragenden Weise am Heizblock (35) montiert sind, so daß sie auf der gleichen Temperatur wie der Heizblock gehalten werden, und Einrichtungen (34) zum Pressen von festem Heißschmelzkleber in den Heizblock in gesteuerten Mengen, die klein genug sind, um ein Vergilben des aufgeschmolzenen Klebers zu verhindern und einen gleichmäßigen Kleberzu-

fluß zu ermöglichen, umfassen.

31. Vorrichtung nach einem der Ansprüche 27 bis 30, dadurch gekennzeichnet, daß die Preßeinrichtungen ein schmales starres Element (82) umfassen, das an Einrichtungen (83) zur Aufbringung einer Linearkraft montiert und parallel zu den einzelnen Streifen des ersten breiten Lagenmaterials sowie auf der gegenüberliegenden Seite derselben angeordnet ist, sowie Einrichtungen (80) zum Erasten der Ausrichtung eines abgeschnittenen Endes der einzelnen Streifen mit einem Rand des ersten breiten Lagenmaterials, wobei diese Abtasteinrichtungen mit den Kraftaufbringungseinrichtungen (83) zusammenwirken, um die Kraftaufbringungseinrichtungen zu aktivieren, wenn eine Ausrichtung ertastet worden ist, wodurch das starre Element (82) den ausgerichteten einzelnen Streifen gegen das erste breite Lagenmaterial preßt.

32. Vorrichtung nach Anspruch 28, dadurch gekennzeichnet, daß die Einrichtungen zum Anordnen eine erste und zweite Tänzerrolle (76, 84) umfassen, die drehbar an einem ersten und zweiten Arm (89, 85) montiert sind, wobei die Arme an einer ersten und zweiten Tänzerwelle (88, 87) fixiert sind und sich das erste breite Lagenmaterial (72) um die Rollen (76, 84) herum erstreckt, wobei die erste Rolle vor den Preßeinrichtungen (82) und die zweite Rolle nach den Preßeinrichtungen in Zuführrichtung des ersten breiten Lagenmaterials angeordnet sind, ein Gestänge mit einem ersten Antriebsarm (90), der an der ersten Tänzerwelle (88) fixiert ist, einem zweiten Antriebsarm (91), der an der zweiten Tänzerwelle (87) fixiert ist, einer Verbindungsstange (91), die die Antriebsarme miteinander verbindet, und einem Rahmen (14), der die Tänzerwellen lagert, Nockeneinrichtungen zum Antreiben des Gestänges, die so geformt sind, daß sie einen Abschnitt des ersten breiten Lagenmaterials (72) benachbart zu den Preßeinrichtungen (82) stationär halten, wenn der einzelne Streifen (10a) gepreßt und verklebt oder angeheftet wird, um diesen Abschnitt mit einer größeren Geschwindigkeit als der zweiten Zuführgeschwindigkeit über eine Strecke vorwärts zu bewegen, die größer ist als die Überlappung, und dann den Abschnitt zurückzubewegen, um das erste breite Lagenmaterial über den Preßeinrichtungen (82) zum Pressen des nächsten einzelnen Streifens (10a) anzuordnen, und Federeinrichtungen (94) zum Vorspannen des Gestänges gegen die Nockeneinrichtungen.

33. Vorrichtung nach einem der Ansprüche 27 bis 32, dadurch gekennzeichnet, daß die Kraftaufbrin-

gungseinrichtungen Luftströme (79) umfassen, die so angeordnet sind, daß sie Luft über die einzelnen Streifen (10a), die gegen das erste breite Lagenmaterial (72) gepreßt und damit verbunden sind, blasen, so daß die einzelnen Streifen aus dem Wege der danach gepreßten und verbundenen einzelnen Streifen herausgedrückt werden.

34. Vorrichtung nach einem der Ansprüche 27 bis 33, die des weiteren Einrichtungen (80) zum Beabstanden der einzelnen Streifen nach dem Abschneiden umfaßt, wobei diese Einrichtungen ein Endlosband (62) aufweisen, das senkrecht zu den breiten Lagenmaterialien und in einer Linie mit den einzelnen Streifen unmittelbar unter den Schneideinrichtungen (40) angeordnet ist sowie eine Vielzahl von Löchern aufweist, ein Antriebsrad (61) und eine das Endlosband lagernde Mitläuferrolle (63), wobei das Rad das Band mit einer Geschwindigkeit antreibt, die größer ist als die erste Geschwindigkeit des schmalen Streifenmaterials, eine hohle Lagereinheit (64), die sich zwischen dem Rad und der Mitläuferrolle (61, 63) erstreckt und sich über seine Länge zu einer Seite hin öffnet, wobei das Endlosband in abgedichteter Weise entlang der offenen Seite läuft, Einrichtungen (69) zum Evakuieren der hohlen Lagereinheit (64) und zum Ziehen von Luft durch die Löcher im Endlosband (62), um die einzelnen Streifen (100) gegen das Band zu ziehen, und Klemmeinrichtungen (65) zum Pressen der einzelnen Streifen (10a) gegen das Endlosband (62), die mit den Schneideinrichtungen (40) zusammenwirken und nur zum Schneidzeitpunkt in Tätigkeit sind, so daß das schmale Streifenmaterial, das die Schneideinrichtungen durchläuft, in Gleitkontakt gegen das Endlosband gezogen wird und, wenn die Schneideinrichtungen einen einzelnen Streifen abschneiden, dieser einzelne Streifen gegen das Endlosband gezogen und vom nicht abgeschnittenen schmalen Streifenmaterial beabstandet wird.

35. Vorrichtung nach einem der Ansprüche 27 bis 34, die des weiteren Einrichtungen (78) zum Erhitzen des ersten breiten Lagenmaterials vor dem Pressen und Verbinden oder Anheften des abgeschnittenen Streifens an das erste breite Lagenmaterial umfaßt.

36. Vorrichtung nach einem der Ansprüche 27 bis 35, dadurch gekennzeichnet, daß die Einstelleinrichtungen ein erstes Endlosband (106), ein zweites Endlosband (108), eine vom ersten Endlosband umschlossene heiße Rolle (102) und eine vom zweiten Endlosband umschlossene kalte Rolle (104) umfassen, wobei das erste Band (106) straff gegen die heiße Rolle (102) und das

zweite Band (108) straff gegen das erste Band um einen Abschnitt der heißen Rolle herum gezogen wird und das zweite Band (108) straff gegen die kalte Rolle (104) sowie das erste Band straff gegen das zweite Band um einen Abschnitt der kalten Rolle herum gezogen wird, so daß das Sandwich-Gebilde zwischen die Bänder geführt und um die Rollen geleitet werden kann, um es unter gleichmäßigem Druck infolge der in den Bändern induzierten Zugspannung zuerst zu erhitzen und dann abzukühlen.

37. Vorrichtung nach einem der Ansprüche 27 bis 35, dadurch gekennzeichnet, daß die Einstelleinrichtungen ein erstes Endlosband (106a), ein zweites Endlosband (108a), das benachbart zum ersten Band über einen Abschnitt ihrer Länge angeordnet ist, Einrichtungen (102a, 102c) zum Erhitzen der Bänder über einen ersten Teil des benachbarten Abschnittes, Einrichtungen (104a, 104c) zum Kühlen der Bänder über einen zweiten Teil des benachbarten Abschnittes und Einrichtungen (116, 192, 195) zum Aufbringen eines Drucks auf das Sandwich-Gebilde umfassen, wenn dieses zwischen den Bändern läuft, wodurch das Sandwich-Gebilde zwischen den Bändern laufen und nacheinander erhitzt und gekühlt werden kann.

38. Vorrichtung nach Anspruch 37, dadurch gekennzeichnet, daß die Einrichtungen zum Erhitzen mindestens eine Heizplatte und die Einrichtungen zum Kühlen mindestens eine Kühlplatte umfassen.

39. Vorrichtung nach Anspruch 38, dadurch gekennzeichnet, daß die Einrichtungen zum Aufbringen eines Drucks auf das Sandwich-Gebilde eine erste Luftkammer (180) gegenüber der Heizplatte, eine zweite Luftkammer (184) gegenüber der Kühlplatte, ein erstes Gebläse (192) zum Zuführen von Druckluft zur ersten Luftkammer und ein zweites Gebläse (195) zum Zuführen von Druckluft zur zweiten Luftkammer umfassen, wodurch Druckluft in der ersten und zweiten Luftkammer die Bänder in Richtung auf die Heizplatte und die Kühlplatte preßt.

Revendications

1. Couverture de fenêtre pour réguler la lumière comprenant une première feuille relativement translucide (72) de matériau, une seconde feuille relativement translucide (87) de matériau, disposée parallèlement à ladite première feuille, une multitude de bandes (10a, 210a) en matériau relativement opaque, chacune ayant des bords, et



- lesdites bandes ayant leurs bords liés à ladite première feuille (72) et à ladite seconde feuille (96), respectivement, d'où il résulte que les parties centrales desdites bandes forment des ailettes qui, dans une première position de fermeture de ladite couverture de fenêtre, sont sensiblement planes et s'étendent sensiblement parallèlement aux première et seconde feuilles (72, 96) permettant au moins en partie de bloquer la transmission de la lumière et, dans une seconde position de ladite couverture de fenêtre, s'étendent généralement transversalement auxdites première et seconde feuilles, permettant de transmettre la lumière entre lesdites ailettes, caractérisée en ce que l'une desdites première et seconde feuilles (72, 96) est un tissu à jour ayant des fils définissant des interstices entre eux et l'autre desdites feuilles est soit une matière fine non tissée telle qu'une matière plastique soit un textile fin à jour ayant des fils définissant des interstices entre eux, les interstices d'une feuille ayant des dimensions et/ou une forme différentes et/ou une orientation différente de celles de l'autre feuille, d'où il résulte qu'on évite l'aspect d'un effet moiré lorsque la lumière est vue à travers les deux feuilles de textile (72, 96).
2. Couverture de fenêtre selon la revendication 1, caractérisée en ce que, dans ladite première position de fermeture, des ailettes contiguës se chevauchent.
 3. Couverture de fenêtre selon la revendication 1 ou 2, caractérisée en ce que les bords des bandes sont liés par adhésif aux première et seconde feuilles au moyen d'un adhésif (16a, 16b).
 4. Couverture de fenêtre selon l'une quelconque des revendications précédentes, caractérisée en ce que les bandes sont constituées d'un textile ayant des fils définissant des interstices entre eux, qui ont des dimensions et/ou une forme et/ou une orientation par rapport aux interstices de ladite feuille ou desdites feuilles en textile différentes, d'où il résulte que l'aspect d'un effet moiré est évité lorsque lesdites bandes s'étendent parallèlement à celles-ci dans la première position de fermeture de ladite couverture de fenêtre.
 5. Couverture de fenêtre selon l'une quelconque des revendications précédentes, caractérisée en ce que les parties des bandes situées entre les bords liés et les parties centrales forment des portions régulièrement incurvées, lorsque la couverture de fenêtre se trouve dans sa seconde position d'ouverture.
 6. Couverture de fenêtre selon l'une quelconque des revendications précédentes, caractérisée en ce que lesdites bandes présentent des portions incurvées dans le sens inverse (141).
 7. Couverture de fenêtre selon l'une quelconque des revendications précédentes, caractérisée en ce que lesdites bandes ont une résilience adéquate pour solliciter lesdits textiles vers ladite première position de fermeture.
 8. Couverture de fenêtre selon l'une quelconque des revendications précédentes, caractérisée en ce qu'une face de chaque ailette est liée à la première feuille et la face opposée de chaque ailette est liée à la seconde feuille.
 9. Couverture de fenêtre pour réguler la lumière comprenant une première feuille relativement translucide (72) de matériau, une seconde feuille relativement translucide (96) de matériau, disposée parallèlement à ladite première feuille, et une multitude de bandes (10a, 210a) en matériau relativement opaque, chacune ayant des bords (16a, 16b) liés à ladite première feuille (72) et à ladite seconde feuille (96), respectivement, d'où il résulte que les parties centrales desdites bandes forment des ailettes qui, dans une première position de fermeture de ladite couverture de fenêtre, sont sensiblement planes et s'étendent sensiblement parallèlement aux première et seconde feuilles (72, 96) permettant au moins en partie de bloquer la transmission de la lumière et, dans une seconde position d'ouverture de ladite couverture de fenêtre, s'étendent généralement transversalement auxdites première et seconde feuilles, permettant de transmettre la lumière entre lesdites ailettes, caractérisée en ce que les parties centrales des bandes (10a, 210a) entre les bords liés (142) sont des portions incurvées régulièrement et inversement (141), lorsque la couverture de fenêtre se trouve dans sa seconde position d'ouverture, et lesdites bandes ont une résilience adéquate pour tenter de solliciter lesdites feuilles vers ladite première position de fermeture.
 10. Couverture de fenêtre pour réguler la lumière selon la revendication 9, caractérisée en ce qu'une face de chaque ailette est liée à la première feuille et la second face de chaque ailette est liée à la seconde feuille.
 11. Couverture de fenêtre pour réguler la lumière selon la revendication 9 ou 10, caractérisée en ce que dans ladite première position de fermeture, des ailettes adjacentes se chevauchent.



12. Couverture de fenêtre pour réguler la lumière selon l'une quelconque des revendications 9 à 11, caractérisée en ce que la couverture de fenêtre comporte en outre un adhésif pour lier lesdits bords de ladite première feuille et de ladite seconde feuille. 5
13. Couverture de fenêtre pour réguler la lumière selon l'une quelconque des revendications précédentes, caractérisée en ce que lesdites feuilles sont des textiles tricotés ou tissés à jour. 10
14. Procédé pour fabriquer une couverture de fenêtre en textile pour réguler la lumière, comprenant la fourniture de première et seconde feuilles larges, relativement translucides (72, 96) en matériau fin de la même largeur donnée, l'introduction dans le sens longitudinal d'une bande étroite de matériau relativement opaque (10), la coupe du matériau en bande en tronçons individuels (10a) sensiblement égaux à ladite largeur donnée des première et seconde feuilles (72, 96), ledit matériau en bande ayant des premier et second bords et des premier et second côtés, le positionnement du premier côté des tronçons coupés et du matériau en bande étroite le long du premier bord contre la première feuille de matériau; le positionnement de la seconde feuille de matériau large (96) pour qu'elle soit en contact avec le second côté des tronçons individuels du matériau en bande étroite et la liaison commune de la première feuille de matériau large (72), des tronçons individuels (10a) du matériau en bande étroite et de la seconde feuille de matériau large (96) afin de former un sandwich lié dans lequel les première et seconde feuilles de matériau large (72, 96) sont mobiles l'une par rapport à l'autre dans une direction perpendiculaire aux tronçons individuels (10a) du matériau en bande étroite, caractérisé par les étapes consistant à appliquer une première ligne adhésive (16a) longitudinalement au matériau en bande étroite contigu au premier bord sur le premier côté; à appliquer une seconde ligne adhésive (16b) longitudinalement au matériau en bande étroite contigu au second bord sur le second côté; à disposer ladite première feuille de matériau large (72) avec son axe longitudinal perpendiculaire aux axes dudit matériau en bande étroite (10a) et à comprimer ensemble la première feuille de matériau large (72), les tronçons individuels (10a) du matériau en bande étroite et la seconde feuille de matériau large (96) de manière à former ledit sandwich lié. 20
15. Procédé selon la revendication 14, caractérisé en ce que l'adhésif est un adhésif thermofusible qui durcit après application et avant les étapes du traitement ultérieur, et ledit procédé comprend en outre le chauffage de la première feuille de matériau large (72) juste avant son positionnement le long du premier côté du matériau en bande étroite de manière à former une liaison par collage avec la première ligne de l'adhésif thermofusible. 25
16. Procédé selon la revendication 14 ou 15, caractérisé en ce que les première et seconde feuilles de matériau large (72, 96) sont introduites à des vitesses constantes de même valeur; et une partie de la première feuille de matériau large (72) est momentanément stoppée pour appuyer sur le tronçon individuel (10a) du matériau en bande étroite sans souiller la ligne d'adhésif, ledit arrêt se produisant tout en continuant l'introduction des première et seconde feuilles de matériau large auxdites vitesses constantes de même valeur. 30
17. Procédé selon la revendication 14, caractérisé en ce que la partie arrêtée de ladite première feuille de matériau est avancée sur une première distance et la partie arrêtée de ladite première feuille de matériau est alors ramenée vers l'arrière sur une seconde distance, ladite première distance étant plus grande que ladite seconde distance et ladite première distance étant plus grande que la largeur desdites bandes coupées. 35
18. Procédé selon la revendication 14, 15 ou 16, comprenant en outre le thermofixage dudit sandwich, sous des tension et pression uniformes, ledit thermofixage comprenant le passage dudit sandwich entre deux courroies (106, 106a, 108, 108a); et le passage dudit sandwich, placé entre lesdites courroies, sur une surface chaude (102, 102b, 102c). 40
19. Procédé selon la revendication 18, comprenant en outre le refroidissement dudit sandwich en faisant passer ledit sandwich placé entre les courroies sur une surface froide (104, 104c). 45
20. Procédé selon la revendication 19, caractérisé en ce que lesdites surfaces chaude et froide sont des rouleaux ou des plaques. 50
21. Procédé selon la revendication 19 ou 20, caractérisé en ce que la température de la surface chaude est d'environ 177°C; et la température de la surface froide est inférieure à environ 49°C. 55
22. Procédé selon la revendication 19, 20 ou 21, caractérisé en ce que la surface chaude est une première plaque plate (102c) et ladite surface froide est une seconde plaque plate (104c), et dans lequel ledit sandwich est maintenu sous une pression uniforme par la pression de l'air. 20



23. Procédé selon l'une quelconque des revendications 17 à 22, caractérisé en ce que les première et seconde feuilles de matériau large sont introduites à des premières tensions identiques et en ce que lesdites courroies sont des courroies tendues soumises à une tension supérieure à celle de ladite première tension dans les première et seconde feuilles de matériau large.
24. Procédé selon la revendication 15, caractérisé en ce que l'adhésif thermofusible est fondu initialement en une petite quantité, ladite petite quantité étant une quantité suffisante pour une application régulière sans jaunissement dû à une exposition prolongée aux températures de fusion.
25. Procédé selon l'une quelconque des revendications 14 à 24, caractérisé en ce que le tronçon coupé de matériau en bande étroite lié à la première feuille de matériau large est contraint à sortir du trajet du tronçon coupé suivant de matériau en bande étroite devant être lié à la première feuille de matériau large par des jets d'air.
26. Procédé selon la revendication 25, caractérisé en ce que les tronçons coupés successifs de matériau en bande étroite sont séparés après coupure par accélération.
27. Dispositif pour fabriquer une couverture de fenêtre pour réguler la lumière, comprenant un moyen (12) pour introduire en continu un matériau en bande étroite (10) longitudinalement à une première vitesse, un moyen (74, 97) pour introduire en continu des première et seconde feuilles de matériau large (72, 96) à une seconde vitesse longitudinalement dans une direction perpendiculaire à ladite direction longitudinale du matériau en bande; un moyen (98-108) pour former un sandwich lié comprenant trois couches, lesdites couches étant le matériau en bande étroite (10) entre les première et seconde feuilles de matériau large (72, 96), caractérisé en ce que ledit moyen pour former un sandwich lié comprend un moyen (21-34) pour appliquer un adhésif au matériau en bande étroite en deux lignes, une première desdites lignes (16a) étant appliquée dans le voisinage d'un premier bord sur un premier côté dudit matériau et une seconde desdites lignes (16b) étant appliquée dans le voisinage d'un second bord sur un second côté dudit matériau; un moyen (40) pour couper le matériau en bande étroite (10) en plusieurs bandes individuelles (10a) d'une longueur égale à la largeur desdites feuilles de matériau large (72, 96); un moyen (82) pour comprimer uniformément lesdites bandes individuelles (10a) contre ladite première feuille de matériau large (72) transversalement sur la largeur de ladite feuille de matériau pour lier par adhésif ou lier par collage lesdites bandes coupées sur ladite première feuille de matériau; et un moyen (79) pour contraindre lesdites bandes coupées (10a) liées ou liées par collage à ladite première feuille de matériau large (72), à sortir du trajet d'une bande coupée devant être comprimée et liée ultérieurement à ladite première feuille de matériau; des courroies (106, 108) entre lesquelles passe le sandwich de couches et des surfaces de chauffage et de refroidissement (102, 104) pour chauffer et refroidir successivement les courroies pour fixer le sandwich de couches à une relation uniforme entre température et dimensions les unes par rapport aux autres.
28. Dispositif selon la revendication 27, caractérisé en ce que le moyen de formage comprend en outre un moyen (76, 84) pour positionner ladite première feuille de matériau large par rapport auxdites bandes coupées afin de fournir une disposition à chevauchement desdites bandes coupées liées auxdites feuilles de matériau large.
29. Dispositif selon la revendication 27 ou 28, caractérisé en ce que le moyen d'application d'adhésif comprend des premier et second rouleaux d'appui espacés l'un de l'autre (21); des premier et second moyens espacés l'un de l'autre (23) et espacés desdits premier et second ajutages, respectivement, lesdits rouleaux d'appui étant montés de manière réglable afin de faire varier l'espacement entre lesdits rouleaux et leurs ajutages respectifs; et un moyen de pompe (34) pour fournir un adhésif auxdits ajutages à un débit proportionnel à l'introduction dudit matériau en bande étroite, d'où il résulte que ledit matériau en bande étroite passe autour du premier rouleau d'appui contigu au premier ajustage, point auquel ledit premier ajustage applique une ligne d'adhésif contiguë au premier bord sur le premier côté dudit matériau en bande, et ledit second matériau en bande passe autour du second rouleau d'appui contigu au second ajustage, point auquel ledit second ajustage applique une ligne d'adhésif contiguë au second bord sur le second côté dudit matériau en bande.
30. Dispositif selon la revendication 29, caractérisé en ce que le moyen d'application d'adhésif comprend en outre un bloc de chauffage (35) pour fondre l'adhésif thermofusible, ledit bloc de chauffage contenant ledit moyen de pompe et lesdits ajutages (21) étant montés sur ledit bloc de chauffage (35) à la manière d'un transfert de chaleur, d'où il résulte que lesdits ajutages sont maintenus à la même température que ledit bloc de chauffage; et un moyen (34) pour contraindre



l'adhésif solide thermofusible à entrer dans le bloc de chauffage dans des quantités contrôlées qui sont suffisamment petites pour éviter le jaunissement de l'adhésif fondu tout en maintenant un écoulement régulier de l'adhésif.

31. Dispositif selon l'une quelconque des revendications 27 à 30, caractérisé en ce que le moyen de compression comprend un élément rigide étroit (82) monté sur un moyen (83) pour appliquer une force linéaire et disposé parallèlement au et sur le côté opposé desdites bandes individuelles par rapport à ladite première feuille de matériau large; et un moyen (80) pour détecter l'alignement d'une extrémité coupée desdites bandes individuelles avec un bord de ladite première feuille de matériau large, ledit moyen de détection coopérant avec ledit moyen d'application de force (83) pour activer ledit moyen d'application de force lorsque ledit alignement est détecté, d'où il résulte que ledit élément rigide (82) comprime la bande individuelle alignée contre la première feuille de matériau large.

32. Dispositif selon la revendication 28, caractérisé en ce que le moyen de positionnement comprend des premier et second rouleaux danseurs (76, 84) montés en rotation sur des premier et second bras (89, 85), respectivement, lesdits bras étant fixés à des premier et second arbres danseurs (88, 87), respectivement, ladite première feuille de matériau large (72) passant autour desdits rouleaux (76, 84) avec ledit premier rouleau situé avant ledit moyen de compression (82) et ledit second rouleau placé après ledit moyen de compression par rapport au sens d'introduction de la première feuille de matériau large; une biellette comportant un premier bras d'entraînement (90) fixé audit premier arbre danseur (88), un second bras d'entraînement (91) fixé audit second arbre danseur (87), une tige de connexion (91) reliant lesdits arbres d'entraînement, et un châssis (14) supportant lesdits arbres danseurs; un moyen de came (93) pour entraîner ladite biellette où ledit moyen de came est façonné de manière à maintenir stationnaire une partie de ladite première feuille de matériau large (72) contiguë audit moyen de compression (82) alors que ladite bande individuelle (10a) est comprimée et liée ou liée par collage, de façon à déplacer ladite partie de tête à une vitesse supérieure à la seconde vitesse d'introduction sur une distance supérieure à la relation de chevauchement et ensuite à ramener en arrière ladite partie afin de positionner ladite première feuille de matériau large sur ledit moyen de compression (82) pour la compression de la bande individuelle suivante (10a); et un moyen de ressort (94) pour solliciter ladite biellette contre

ledit moyen de came.

33. Dispositif selon l'une quelconque des revendications 27 à 32, caractérisé en ce que le moyen de contrainte comprend des jets d'air (79) placés de manière à souffler de l'air sur les bandes individuelles (10a) comprimées et liées à ladite première feuille de matériau large (72), d'où il résulte que lesdites bandes individuelles sont contraintes à sortir du trajet des bandes individuelles ultérieurement comprimées et liées.

34. Dispositif selon l'une quelconque des revendications 27 à 33, comprenant en outre un moyen (60) pour écarter lesdites bandes individuelles après coupe, ledit moyen d'écartement comprenant une courroie sans fin (62) disposée perpendiculairement auxdites feuilles de matériau large et en ligne avec lesdites bandes individuelles, immédiatement au-dessous dudit moyen de coupe (40), ladite courroie sans fin comportant une multitude de trous s'étendant à travers elle; une roue d'entraînement (61) et un rouleau fou (63) supportant ladite courroie sans fin, ladite roue entraînant ladite courroie à une vitesse supérieure à ladite première vitesse dudit matériau en bande étroite; une structure de support creuse (64) s'étendant entre ladite roue et ledit rouleau fou (61, 63), ladite structure débouchant sur un côté de sa longueur et ladite courroie sans fin se déplaçant de manière étanche le long dudit côté ouvert; un moyen (69) pour évacuer ladite structure de support creux (64) et entraîner l'air à travers lesdits trous de la courroie sans fin (62) afin de plaquer les bandes individuelles (100) contre ladite courroie; et un moyen de pincement (65) pour comprimer lesdites bandes individuelles (10a) contre ladite courroie sans fin (62), ledit moyen de pincement coopérant avec ledit moyen de coupe (40) pour agir seulement au moment de la coupe, d'où il résulte que ledit matériau en bande étroite traversant ledit moyen de coupe est plaqué contre la courroie sans fin dans un contact coulissant, et lorsque ledit moyen de coupe sectionne une bande individuelle, ladite bande individuelle est entraînée contre ladite courroie sans fin et éloignée dudit matériau en bande étroite non coupé.

35. Dispositif selon l'une quelconque des revendications 27 à 34, comprenant en outre un moyen (78) pour chauffer ladite première feuille de matériau large avant de comprimer et de lier ou de lier par collage ladite bande coupée à ladite première feuille de matériau large.

36. Dispositif selon l'une quelconque des revendications 27 à 35, caractérisé en ce que le moyen de



fixage comprend une première courroie sans fin (106); une seconde courroie sans fin (108), un rouleau chaud (102) enfermé dans ladite première courroie sans fin, et un rouleau froid (104) enfermé dans ladite seconde courroie sans fin; où ladite première courroie (106) est serrée contre le rouleau chaud (102) et ladite seconde courroie (108) est serrée contre ladite première courroie autour d'une partie du rouleau chaud, et ladite seconde courroie (118) est serrée contre le rouleau froid (104) et ladite première courroie est serrée contre ladite seconde courroie autour d'une partie du rouleau froid, d'où il résulte que ledit sandwich peut passer entre lesdites courroies et autour desdits rouleaux pour tout d'abord chauffer et ensuite refroidir ledit sandwich sous une pression uniforme due à la tension provoquée dans lesdites courroies.

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37. Dispositif selon l'une quelconque des revendications 27 à 35, caractérisé en ce que le moyen de fixage comprend une première courroie sans fin (106a); une seconde courroie sans fin (108a) disposée dans le voisinage de ladite première courroie sur une partie de leur longueur; un moyen (102a, 102c) pour chauffer lesdites courroies sur une première partie de la portion adjacente; un moyen (104a, 104c) pour refroidir lesdites courroies sur une seconde partie de la portion adjacente; et un moyen (116, 192, 195) pour appliquer une pression audit sandwich lorsqu'il passe entre lesdites courroies, d'où il résulte que ledit sandwich peut passer entre lesdites courroies et être successivement chauffé et refroidi.

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38. Dispositif selon la revendication 37, caractérisé en ce que le moyen de chauffage comprend au moins une plaque chaude et dans lequel ledit moyen de refroidissement comprend au moins une plaque froide.

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39. Dispositif selon la revendication 38, caractérisé en ce que le moyen pour appliquer une pression audit sandwich comprend une première chambre à air (180) placée à l'opposé de ladite plaque chaude, une seconde chambre à air (184) disposée à l'opposé de ladite plaque froide, un premier ventilateur d'air (192) pour fournir de l'air pressurisé à ladite première chambre à air, et un second ventilateur d'air (195) pour fournir de l'air pressurisé à ladite seconde chambre à air, où l'air pressurisé dans lesdites première et seconde chambres à air sollicite les courroies vers ladite plaque chaude et ladite plaque froide, respectivement.

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