

Description

This invention relates to a process and apparatus for fabricating honeycomb material.

BACKGROUND OF INVENTION

Commonly-assigned U.S. Patent No. 4,885,190 describes a process and machine for making expandable honeycomb material, the contents of which patent are hereby incorporated by reference. The underlying concept is to feed a strip of material from a continuous supply, apply lines of adhesive to the material, cut the strips into desired widths, fold the strips into flat tubular form, and then wind the tubular strips on an annular rack. The adhesive lines are located such that those on top of each tube are located below the bottom of the superposed tube. The resultant assembly of tubes after further processing is heated to activate or soften the glue and compressed to cause the stacked tubes to permanently adhere to one another. With the provision of suitable creases and pleats, an expandable honeycomb structure results of a type that has proved very popular with the public as a window covering. U.S. Patents Nos. 4,450,027 and 4,849,039 describe other ways of making a similar structure. One aspect of the present invention is to provide an alternative method and apparatus that offers certain advantages.

The honeycomb structure described above offers a window covering with insulating properties if the material used will block or attenuate air flow. If the material is transparent, it will allow light passage; if opaque, it will block light. But the resultant structure cannot control the passage of light in the same sense that a conventional venetian blind allows a user by tilting the slats to control the passage of light through a window into a room.

U.S. Patent No. 3,384,519 describes a honeycomb structure that is capable of controlling the light passing through. It is made up of transparent cloth sheets interconnected by cloth strips functioning as slats. By making the cloth strips opaque, light will be blocked in one position of the cloth sheets when the strips lie flat and abut or overlap, and light can pass in another position of the cloth sheets when the strips extend in parallel planes. However, the method and apparatus described in this patent for making this structure have certain disadvantages.

In accordance with a first aspect of the invention, a method of fabricating an expandable window covering comprising the steps of feeding a continuous strip of material containing at least one line of adhesive in the longitudinal direction of the continuous strip along a feed path and cutting the continuous strip into predetermined lengths by means of a cutter positioned adjacent said feed path, characterised by the further steps of accelerating each cut strip as it

passes downstream from said cutter to a stacker, receiving said cut strip in said stacker and stacking said cut strips in superimposed relation with the previously stacked strips and securing each strip by means of said at least one adhesive line to the previously stacked strip in the stacker.

A feature of this aspect of the invention is to accelerate the cut strips to the stacker. This allows the time needed for each strip to reach its final stacking position and be discharged before the next strip arrives. As a result, the processing of the continuous strip can be uninterrupted, and a higher production rate of the finished product is possible.

In accordance with a second aspect there is provided apparatus for carrying out the method of the invention, said apparatus comprising a supply of continuous strip material having lines of adhesive thereon; a strip feeder for feeding said strip material continuously longitudinally along a feed path and a cutter positioned adjacent said feed path to sever said continuous strip into predetermined lengths, characterised in that an accelerator is positioned downstream from said cutter for accelerating the cut strips and in that a stacker is provided for receiving and stacking the cut strips in superimposed relation with the previously stacked strips.

Other objects and advantages of the invention will be apparent from the detailed description that follows of several embodiments in accordance with the different aspects of this invention, which should be taken in conjunction with the accompanying drawings.

SUMMARY OF DRAWINGS

In the drawings:

Figure 1 is a schematic side view of one form of apparatus in accordance with a first aspect of the present invention;

Figure 1A is a detail view of the strip cutter of the apparatus of Figure 1;

Figure 2 is a cross-sectional view along the line 2-2 of Figure 1;

Figure 3 is a cross-sectional view along the line 3-3 of Figure 1;

Figure 4 is a cross-sectional view along the line 4-4 of Figure 1;

Figure 4A is a perspective view of a modified form of cut strip handler;

Figure 5 is a schematic side view of one form of apparatus in accordance with a second aspect of the present invention;

Figure 6 is a somewhat schematic cross-sectional view of the end product formed by the apparatus of Figure 5;

Figure 7 is a view of the end product of Figure 6 shown in its expanded position;

Figure 8 is an end view of the middle web of Fig-

ure 5 showing the slitting lines;
 Figure 9 is a cross-sectional view similar to Figure 7 showing a modification;
 Figure 10 is a view similar to Figure 9 showing a further variation;
 Figure 11 is a schematic view illustrating processing of the product shown in Figure 10.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Figures 1-4 illustrate a process and apparatus in accordance with a first aspect of this invention to fabricate a honeycomb structure of the type described in the above-referenced U.S., Patents Nos. 4,450,027; 4,849,039; and 4,885,190. The starting point for the present invention, indicated at the arrow 8, is a pre-creased and pre-folded flat tubular strip of material 10. It would be in a form corresponding to that stage of the processing in (a) Patent No. 4,450,027, between the crimper 80 and the adhesive applicator 120, or after the adhesive applicator 120, or in (b) Patent No. 4,849,039, before the adhesive applicator, or in (c) Patent No. 4,885,190, between the drive wheel 108 and the stacker 120. While it is preferred that the adhesive lines not be applied to the strip until after it has been creased and folded into the desired tubular form, this is not essential to the present invention, and the adhesive lines, if desired, can be provided earlier in the processing, as described in Patent No. 4,885,190.

As shown in Figure 1, the pre-creased and pre-folded strip 10 is passed around a direction-reversing roller 11 to increase the wrap angle about a heated or cooled roller 12 which functions similar to the heaters or coolers used in the referenced patents to supply the necessary heat or cold to quick-dry lines of adhesive applied by an applicator schematically indicated at 13. The choice of heat or cold depends upon the adhesive selected and is not important to the present invention. The applicator 13, similar to that described in the referenced patents, applies two parallel lines of a suitable adhesive to the edges of the folded tube. The folded tube at this stage, referenced 15, has the same shape as that depicted in Figure 2 by numeral 20. The outer edges, which are typically sharply creased to form the characteristic shape of such structures as depicted in Figure 13 of Patent No. 4,885,190, are shown folded for simplicity. The free, folded-over edges 21 are each provided with an adhesive line 22 as described.

The continuous strip 10, which was fed into stage 8 from a continuous roll (not shown), is fed by roller 23 to a conventional synchronous shearing device or cutter 25 represented by one rotating drum or cutter 26 carrying a cutting blade 27 and one fixed drum 31. Preferably, the drum 26 is covered with a thin foam layer 27' through which the blade 27 protrudes. The

drum 26 rotates at a speed synchronized to the feeding rate of the strip 20. Suitable synchronizing means, shown schematically by block 24, are well known in the art. Whenever the blade 27 rotates to the 6 o'clock position and becomes aligned with the drum 31 below, the blade cutter 27 extending through the compressed foam 27' at the line of contact severs the strip 15 at that line of intersection of the two drums. This cutter thereby forms predetermined lengths of strips 20 from the continuous supply irrespective of the strip feed rate.

In most instances, however, it will be difficult to coordinate the desired strip length with the desired feed rate. A preferred embodiment therefore is to use small rollers 26, 31 which do not cut the strip at each revolution and provide a mechanism to control when the cutting action takes place. This is illustrated in Figure 1A, which is a side view of the rollers 26, 31 without the processing strip present. In this embodiment, each of the rollers is supported on a respective shaft 80, 81 for rotation. Also, respective gears 82, 83 are connected to the shafts. A bearing 85 mounted on a support member 86 supports the shaft 81. The member 86 is in turn connected to the movable piston 87 of an air cylinder 88. Connected to the air cylinder 88 is a control 90, which may be electronic or electrical.

The arrangement is such that in the non-cutting position, there is a loose or sloppy mesh of the gear teeth of the gears 82 and 83. When the shaft 80 is driven, the shaft 81 rotates at the same speed. This sloppy mesh is achieved by simply lowering the shaft 81 a short distance - as little as five thousandths of an inch is sufficient - so that when the knife edge 27 (Figure 1) rotates into vertical alignment with the roller 31 below, no contact is made and thus no cutting ensues. To achieve the cutting position, all that is necessary is simply to close up the spacing between the two rollers so that the knife edge does contact the surface of the roller 31 now serving as an anvil to cut any strip passing below. In the illustrated embodiment, this small movement is achieved by activating the air cylinder 88, which moves the piston up and the roller 31 to bring about the cutting action. The sloppy gear mesh allows for the closing up of the space. The block 90 represents any kind of known appropriate control for actuating the air cylinder after a predetermined number of revolutions has taken place, corresponding to the desired length of the strip 20. If desired, the support 86 can be part of a suitable toggle mechanism, which locks the support 86 when moved to its cutting position. This provides a firmer support for the roller 31. To further increase the firmness of the support, the roller 31 can be mounted on a yoke in turn connected to the shaft 81, with the yoke moved up and down between cutting and non-cutting positions.

While in the illustrated embodiment of Figure 1,

the roller 26 is shown above, and the roller 31 below, the reverse arrangement is also possible and may have certain advantages when the strip 15 is oriented with the glue lines at the bottom as shown, namely, it will avoid spreading of the contacted glue lines over the contacted roller surface.

4 The severed strips 20 are supported in opposed support means 14 having side channels 14' as illustrated in Figure 2, and are driven forward by drive rollers 28 forming a high-speed, accelerating nip 29. In the arrangement as shown, the spacing of the nip 29 from the cutter 25 is such that the strip 20 enters and is grabbed by the nip 29 just before, just after, or while it is severed by the cutter 25 from the upstream continuous strip 15, that is, substantially at the time of severing. Figure 3 shows the configuration of the drive rollers 28. The lower roller 28 is divided into split rollers 28-1, 28-2 on a common shaft (not shown) to avoid spoiling the adhesive lines 22. At that point, guided by the side supports 14, the severed strip 20 is accelerated into a straight horizontal stacker 32.

The stacker 32 comprises opposed side supports 33 with guide channels 34, similar to the side supports 14 in Figure 2. The side supports 33 terminate in an end stop 35. Above the side supports is located a pusher plate 37 connected to a piston 38 which is part of a conventional hydraulic cylinder (not shown). Below the side supports is a receptacle 40 which has vertical walls spaced apart by the width of the strip 20. The apparatus is timed such that when the severed strip hits the end stop 35, the hydraulic cylinder is energized, the pusher plate 37 pushes down and the folded strip 20 is pushed out of the channel 34 and deposited in superposed relation to the previously processed strips 20. As will be noted in Figure 4, the severed strips 20 are stacked such that the adhesive lines 22 at the bottom of each folded strip are in contact with the top side of the adjacent folded strip. The further processing of the stacked strips in receptacle 40 is not shown, because it can be carried out in a conventional manner as described in the referenced patents, namely, pressure and heat is applied to the stack in receptacle 40 to activate the adhesive lines and cause the severed strips to adhere to one another to form the desired unitary honeycomb structure.

As will be observed from the following description, the process of the invention involves a continuous feed of the starting material at stages 8 and 15, followed by severing at stage 25 into predetermined individual strips, which are then accelerated into the stacker 32. This is a key feature of the invention. The object is, to the extent possible, a process operable at a high speed, i.e., a process whose production rate is determined by the feed rate of the original strip 8. If the strip 8 were fed into the stacker 32 at its normal feed rate, the process would not work properly, because the next severed strip would be entering the

stacker while the stacker is proceeding to discharge the previous strip. A feature of the invention is that, by accelerating the previous cut strip into the stacker, sufficient time is made available to process that previous strip in the stacker before the next strip is introduced into the stacker. Considered from a broad aspect of the invention, by accelerating a cut strip from a continuous supply during the overall processing, downstream processing of the discrete strips can be consummated before the upstream processing has provided the next cut strip. Preferably, the cut strip accelerator operates at a feed rate that is approximately a factor of two or greater than that of the upstream feed rate. The feed rate differential would depend on the amount of time required in the downstream stacker to discharge the cut strip or at least move the cut strip out of the path of the next cut strip. While in the specific embodiment, the nip grabs the strip 20 substantially at the time of cutting, this is not necessary. There is no restriction as to when the accelerator operates on the severed strip after it has been severed. In other words, assuming the stacker 32 is located further downstream, then the acceleration of the cut strip can occur a substantial time after it has been severed. It will be recognized that side guides for the accelerated strip are necessary to maintain its orientation relative to the stack of strips below it. The side guides 33 maintain that desired orientation. The pusher becomes useful to push the strips downward out of the channel into the stack below. This positive discharge into the stacker receptacle is an alternative to pivoting outwardly the bottom half of the side guides 33 to allow the cut strip 20 to fall by gravity into the receptacle 40 below. Also, the pusher 37 can help maintain the desired horizontal orientation of the strips.

As a further alternative, as illustrated in Figure 4A, the two side guides 33 with channels 34 can each be replaced by cylinders 41 containing parallel longitudinal slots, or grooves 42, corresponding to the channels, arranged around each cylinder circumference. An indexing device shown schematically at 43 is connected to each cylinder 41. When the cut strip 20 has entered opposed slots 42 on the cylinders, which slots are closed off at their remote end to function as stops, the cylinders 41 are indexed - the right one CCW; the left one CW - with the result that the strip 20 drops through to the holder below, and fresh empty slots are presented to receive the next strip. If an adhesive is used that adheres on contact, then heating to activate will be unnecessary. If desired, the holder can be replaced with a chute that carried the dropped strip 20 to a conveyor 46 that carries the strips 20 downstream where it can be cut if desired and then assembled into the unitary structure. Suitable dimensions for the cylinders 41 would be about 101,6 mm (4 inches) in diameter with about 209,5 mm (8 one-quarter inch) wide grooves 42.

The material of the strips and/or the adhesive employed is not critical to the invention. Any of the materials disclosed and any of the adhesives disclosed in the three referenced patents can be used in the process according to this first aspect of the invention. If adhesives are used that remain tacky, the strip handling elements are readily configured to avoid contact with the adhesive lines. See, for example, Figure 3.

While the synchronized cutter described is preferred, any type of cutter can be employed that will guarantee cut strips of substantially the same length. The synchronized cutter is preferred because the feed rate may fluctuate. But, if suitable control means can be provided, using feed rate sensors and microprocessor control, or suitable sensors provided for accurately measuring the passage of a predetermined length of strip, the microprocessor can control the activation of a conventional cutter to ensure that strips of substantially the same length are provided to the stacker. It will be evident that other techniques can be devised to accommodate strips that may vary in length, such as by trimming off the ends of the unitary structure. It will also be appreciated that suitable means must be provided to replace the receptacle 40 if used, when filled, with a fresh receptacle, but this is readily accomplished manually or automatically so as not to interrupt the continuous process.

As will be clear from the foregoing description, one of the features is a continuous process in which material is constantly conveyed in the downstream direction of the process. This concept also applies to the description of the embodiments that follow of the second aspect of the invention.

In the description that follows of an embodiment in accordance with the second aspect of the invention, it will be appreciated that when reference is made to an optically transparent material, this is meant to cover a clear material or a translucent material which allows light directly or in diffused form to pass through, or a coarse mesh or other coarse material. Whereas, when the term optically opaque is used, this is meant to include a condition wherein light is normally blocked or diffused such that objects on the outside are not imaged on the window and therefore are not identifiable unless the user knows the structure or its access. Thus, by appropriate choice of material for the third intermediate web, any degree of darkening can be achieved, and thus the invention is not limited to a particular material. The use of a mesh or coarse material for the outer webs will enhance air flow.

In distinction to the earlier embodiments, this embodiment starts with webs or sheets of material instead of strips. The length of the strips in the previous embodiments determines the width of the honeycomb structure produced. In the previous embodiment also, the quantity of stacked strips determines the length of the honeycomb structure, typically the

vertical dimension of a conventional window covering, the width being the window width. In the next embodiment, the width of the web or sheet determines the length of the honeycomb structure.

The starting point is a supply from continuous rolls (not shown) of first 50, second 51, and third 52 webs or sheets of material. Suitable adhesive application means 55 are provided, similar to that described in connection with Figure 1, to provide longitudinal lines of quick-dried or other adhesive 57 to the first and second sheets 50, 51 via a conventional heated or cooled roller 58. The middle or third sheet 52 is fed at an equal rate with sheets 50 and 51 through a conventional slitter 59, which divides the middle sheet into a plurality of longitudinal strips 60 along lines 61 extending parallel to the downstream direction of the webs. See Figure 8. Instead of applying glue lines to the outer webs, alternatively, glue lines can be applied to opposite sides of the long edges of the strips 60, or at appropriate places to opposite surfaces of the second sheet 52 before it is slitted. As still another alternative, the supply of the strips, instead of being a single sheet subsequently slitted, can be a plurality of spools each supplying one of the strips. Figure 8 illustrates the subdivision of the web or sheet 52 into discrete strips 60 by slitting along the dotted lines referenced 61. A slitter similar to that employed in Patent No. 4,885,190 can be used for this purpose. The slit strips 60 are maintained in their adjacent planar orientation by means of a conveyor belt system referenced 64. If desired, as is known, suitable reduced pressure can be applied to perforated belts of the conveyor system 64 to ensure that the cut strips maintain their original position. The outer webs 50, 51 and the inner subdivided strips 60 are juxtaposed and joined at rollers 70, and then fed through heated rollers 71. The latter function to supply heat and pressure to activate the continuous adhesive lines 57 to cause the outer edges of each of the strips 60 to bond respectively to the upper 50 and lower 51 webs. If non-heat-activated adhesives are used, the roller 71 need not be heated.

Figure 6 illustrates the arrangement. The adhesive lines 57 are applied continuously in the downstream direction such that each line 57 on the upper sheet 50 faces the left edge (as viewed in Figure 6) of each strip 60, and each line 57 on the lower sheet 51 faces the right edge of each strip 60. When the so arranged materials pass through the boner rolls 71, each strip left edge is bonded to the upper sheet, and each strip right edge is bonded to the lower sheet. The resultant assembly, referenced 72, can then be wound up on a roll 73 for further processing.

The process, as will be noted, is continuous and uninterrupted. The resultant structure wound up on the roll 73 has strips 60 extending lengthwise in the structure. In comparison, the intermediate strips in the rolled up structure depicted in the referenced Pa-

tent No. 3,384,519 extend transverse to its longitudinal direction. As previously mentioned, in the process according to this second aspect of the invention, the width of the outer sheets (the horizontal dimension in Figure 6) corresponds to the length of a window covering with horizontal slats. The structure resulting in the process of the invention depicted in Figure 6 can be used in the same manner as depicted in the Patent No. 3,384,519. Assuming that the outer sheets 50,51 are light transparent, and the strips 60 are light opaque, in the window covering position shown in Figure 6, when the strips are maintained parallel and substantially in the same plane by pulling the outer sheets in the directions indicated by the arrows, substantially all of the light incident on one of the outer sheets is blocked. For clarity, spaces have been left between adjacent edges of the sheets, but in actual practice the sheet edges would abut or overlap for maximum light blocking. If the outer sheets now are displaced in the opposite direction, as indicated by the arrows in Figure 7, until the strips 60 extend in spaced parallel planes, as illustrated in Figure 7, it will be evident that minimum blockage of light incident on one of the outer sheets occurs. Intermediate positions of the outer sheets can thus vary the light transmission between the minimum and maximum values described above. Using outer sheets that are air transparent and inner strips that are air opaque would similarly control air flow between minimum and maximum values. In the embodiment illustrated in Figure 6, the middle sheet 52 has been slit into six individual strips. It is of course evident that the invention is not limited to this number. The principal restriction of the invention is the overall width of the sheets, which determines the length of a window covering with horizontal slats. But sheets of suitable material of a width length or height are readily obtainable from material suppliers.

As before, any of the materials and adhesives described in the four referenced patents can be employed in this process in accordance with the second aspect of the invention. Moreover, while this aspect of the invention has been described in connection with a light controlling window covering, it is not limited thereto. By a relatively simple modification, more complex honeycomb configurations can be produced by providing more continuous webs and/or more strips, or by varying the location of the strips relative to the webs or relative to each other.

Figure 9 is a view similar to Figure 7 of a variant employing three webs and offset strips in different planes. Figure 9 shows the end product in one intermediate position of the three webs. The webs, referenced 71,72 and 73 would be fed in a direction extending into the plane of the drawing of Figure 9, while two intermediate webs would be slit along lines offset by one-half the strip width between each pair of sheets to form strips 74,75. Adhesive lines 76 would

be applied where shown to the strip edges or to the overlying and underlying webs to form bonds between the strip edges and the overlying and underlying webs at the adhesive lines 76 when the assembly of material is juxtaposed and passed through rollers to activate the adhesive lines and apply pressure to form the bonds. The resultant honeycomb structure would possess 4-sided cells extending in the length direction of the webs. It is evident that the structure of Figure 9 can be enhanced using 4,5 or more webs to produce more complex cell configurations. The strips at the same level preferably abut rather than overlap to reduce overall thickness. Strips at different levels may or may not overlap.

A structure made by a process similar to that described in connection with the Figure 9 embodiment will result in a honeycomb containing the conventional 6-sided or hexagonal cells. This is illustrated in Figure 10 with eight horizontal webs, though it will be understood that less than eight or more than eight webs could be included to vary the height (vertical dimension in Figure 10) of the honeycomb core. In the case of an 8-webbed structure, each of the webs 100,110,111 would be supplied as sheets from rolls as described in connection with the previous embodiments. One row of cells 96 formed between two webs 110,111 has been amplified to illustrate the bonding. The remaining rows are similarly constructed. The webs 110,111 illustrated by the thicker lines, are interconnected by a layer of strips 112 bonded to the webs 110,111 at junctions 96. The total width of each strip layer (if laid flat in a horizontal plane) is substantially equal to one-half the overall width of each sheet plus the small extras at each side to form the bonding junctions 95. Each layer of strips can be slit from a common sheet and spaced apart as indicated, or the strips can each be supplied from its own strip roll. As before, at the conclusion of the bonding, a flat structure results which can be wound up on a roll, or further processed downstream. As will be observed, when the webs 100,110,111 of the structure are pulled as illustrated in Figure 7, the honeycomb structure illustrated in Figure 10 results. Each 6-side cell 96 has 1 or 3 sides provided by an upper web (dark line - 110), 3 or 1 sides provided by a lower web (dark line - 111), and 2 sides provided by two adjacent strips (double lines - 112) which incline in opposite directions. (The darkened and double lines have only been shown for one row of cells.) The pitch of the strips during processing will thus equal twice the length of a hexagonal side.

While the resultant honeycomb may find use in several applications, it is preferred to use the honeycomb as shown in Figure 10 as a core by adhering sheets to the open-ended sides. As one example, illustrated in Figure 11, the Figure 10 structure is further processed by slitting (see Figure 11) with a cutter 97 transverse to its longitudinal dimension (perpen-

dicular to the drawing plane of Figure 10 and horizontal in Figure 11) as indicated to form thin core sections 98, on opposite sides of which is bonded or laminated a thin sheet 99 of flexible or semi-rigid or rigid material. The bonding is readily achieved by laying down adhesive on the open cell edges or on the outer sheets 99. If material were chosen for the webs, the strips, and the outer sheets that was substantially air-opaque, then the now-closed honeycomb cells would form many dead air spaces. The structure that thus results, designated 115, could be used as a thermal barrier which is light weight and could be produced very economically. In this application, the honeycomb with the bonded outer sheets would not be expandable. It will thus be seen that the width of the honeycomb core is substantially equal to about two-thirds of the width of the original webs, the thickness is determined by the slitting operation with the cutter 97, and the core length would depend upon the number of webs and layers of strips chosen.

Though not shown in Figure 5, with certain materials it may be desirable to score the strips 60 before they are assembled and adhered to the outer webs 50, 51. The scoring preferably is provided at the strip locations where the strips bend when the finished shade is opened as shown in Figure 7. Score lines are readily formed in the strips 60 at such fold locations indicated by the arrows 80 in Figure 7 to assist in defining the strip shape, to simplify folding, or to enhance its appearance. This improvement can also be included for the embodiment of Figure 9.

It will be understood from the description given that the invention is not limited to webs of the same color. In the second aspect of the invention, the front and back sheets can be of colors different from one another as well as different from the intermediate strips. Moreover, if the strips are supplied from separate spools, even they can be of different colors. Also, the invention is not limited to varying colors, but could also include other attributes of the material, such as texture and degree of transparency or porosity.

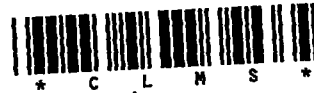
The typical sheet material or webs used for such structures are usually stretched in their long direction to improve their strength and reduce stretching during use. In the structures made according to the invention, if hung horizontally, depending upon the width of the window, some stretching may occur. This can be avoided by using blown sheets of material, which have uniform strength properties in all directions. Alternatively, the honeycomb structure can be arranged so that the strips corresponding to the slats in a conventional venetian type blind are hung vertically in the direction in which the material is normally stretched.

While the invention has been described and illustrated in connection with preferred embodiments, many variations and modifications as will be evident to those skilled in this art may be made therein without

departing from the scope of the claims and the invention as set forth in the appended claims is thus not to be limited to the precise details of construction set forth above as such variations and modifications are intended to be included within the scope of the appended claims.

Claims

1. A method of fabricating an expandable window covering comprising the steps of feeding a continuous strip (15) of material containing at least one line of adhesive in the longitudinal direction of the continuous strip along a feed path and cutting the continuous strip into predetermined lengths (20) by means of a cutter (25) positioned adjacent said feed path, characterised by the further steps of accelerating each cut strip as it passes downstream from said cutter to a stacker (32), receiving said cut strip in said stacker and stacking said cut strips in superimposed relation with the previously stacked strips and securing each strip by means of said at least one adhesive line to the previously stacked strip in the stacker.
2. A method according to claim 1, characterised in that said cut strip (20) is pushed in superimposed relation to the previously stacked strips.
3. A method according to claim 2, characterised in that the stacker comprises laterally spaced side supports (33) defining a longitudinally extending pass-through slot which is narrower than the width of said cut strips (20) wherein a cut strip which has been received by said stacker (32) is pushed through said pass-through slot to the previously stacked strips.
4. A method according to claim 3, characterised in that the stacker (32) is provided with a receptacle (40) for receiving the stacked strips.
5. A method according to any preceding claim, characterised in that each cut strip (20) is engaged by an accelerator (28, 29) spaced downstream from said cutter, whereby each strip is accelerated substantially at the same time or after the time that it is severed from the continuous strip (15).
6. A method according to any preceding claim, characterised in that adhesive has been applied to the strip material (10, 15) prior to cutting the strip material by the cutter (25).
7. A method according to any preceding claim, characterised in that the cut strips (20) are fed by the accelerator (28, 29) at a speed which is greater



dicular to the drawing plane of Figure 10 and horizontal in Figure 11) as indicated to form thin core sections 98, on opposite sides of which is bonded or laminated a thin sheet 99 of flexible or semi-rigid or rigid material. The bonding is readily achieved by laying down adhesive on the open cell edges or on the outer sheets 99. If material were chosen for the webs, the strips, and the outer sheets that was substantially air-opaque, then the now-closed honeycomb cells would form many dead air spaces. The structure that thus results, designated 115, could be used as a thermal barrier which is light weight and could be produced very economically. In this application, the honeycomb with the bonded outer sheets would not be expandable. It will thus be seen that the width of the honeycomb core is substantially equal to about two-thirds of the width of the original webs, the thickness is determined by the slitting operation with the cutter 97, and the core length would depend upon the number of webs and layers of strips chosen.

Though not shown in Figure 5, with certain materials it may be desirable to score the strips 60 before they are assembled and adhered to the outer webs 50, 51. The scoring preferably is provided at the strip locations where the strips bend when the finished shade is opened as shown in Figure 7. Score lines are readily formed in the strips 60 at such fold locations indicated by the arrows 80 in Figure 7 to assist in defining the strip shape, to simplify folding, or to enhance its appearance. This improvement can also be included for the embodiment of Figure 9.

It will be understood from the description given that the invention is not limited to webs of the same color. In the second aspect of the invention, the front and back sheets can be of colors different from one another as well as different from the intermediate strips. Moreover, if the strips are supplied from separate spools, even they can be of different colors. Also, the invention is not limited to varying colors, but could also include other attributes of the material, such as texture and degree of transparency or porosity.

The typical sheet material or webs used for such structures are usually stretched in their long direction to improve their strength and reduce stretching during use. In the structures made according to the invention, if hung horizontally, depending upon the width of the window, some stretching may occur. This can be avoided by using blown sheets of material, which have uniform strength properties in all directions. Alternatively, the honeycomb structure can be arranged so that the strips corresponding to the slats in a conventional venetian type blind are hung vertically in the direction in which the material is normally stretched.

While the invention has been described and illustrated in connection with preferred embodiments, many variations and modifications as will be evident to those skilled in this art may be made therein without

departing from the scope of the claims and the invention as set forth in the appended claims is thus not to be limited to the precise details of construction set forth above as such variations and modifications are intended to be included within the scope of the appended claims.

Claims

1. A method of fabricating an expandable window covering comprising the steps of feeding a continuous strip (15) of material containing at least one line of adhesive in the longitudinal direction of the continuous strip along a feed path and cutting the continuous strip into predetermined lengths (20) by means of a cutter (25) positioned adjacent said feed path, characterised by the further steps of accelerating each cut strip as it passes downstream from said cutter to a stacker (32), receiving said cut strip in said stacker and stacking said cut strips in superimposed relation with the previously stacked strips and securing each strip by means of said at least one adhesive line to the previously stacked strip in the stacker.
2. A method according to claim 1, characterised in that said cut strip (20) is pushed in superimposed relation to the previously stacked strips.
3. A method according to claim 2, characterised in that the stacker comprises laterally spaced side supports (33) defining a longitudinally extending pass-through slot which is narrower than the width of said cut strips (20) wherein a cut strip which has been received by said stacker (32) is pushed through said pass-through slot to the previously stacked strips.
4. A method according to claim 3, characterised in that the stacker (32) is provided with a receptacle (40) for receiving the stacked strips.
5. A method according to any preceding claim, characterised in that each cut strip (20) is engaged by an accelerator (28, 29) spaced downstream from said cutter, whereby each strip is accelerated substantially at the same time or after the time that it is severed from the continuous strip (15).
6. A method according to any preceding claim, characterised in that adhesive has been applied to the strip material (10, 15) prior to cutting the strip material by the cutter (25).
7. A method according to any preceding claim, characterised in that the cut strips (20) are fed by the accelerator (28, 29) at a speed which is greater



than the speed at which the strip material (10,15) is fed by a strip feeder (23,12) to the cutter.

8. A method according to claim 7, characterised in that sufficient time is made available to process the previous strip in the stacker (32) before the next strip is introduced in the stacker.
9. A method according to any preceding claim, characterised in that successive cut strips (20) are fed to the stacker (32) at spaced instants of time.
10. A method according to any preceding claim, characterised in that the accelerated strip is located at a predetermined position on said path and in that each strip is subsequently secured by means of said at least one adhesive line to another portion of said window covering while said strip is in said position.
11. A method according to claim 10, characterised in that the next cut strip is accelerated downstream from said cutter only after said previous strip has been located at said predetermined position.
12. A method according to any preceding claim, characterised in that the continuous strip comprises a pre-creased, pre-folded strip of material.
13. A method according to any preceding claim, characterised in that pressure is applied to the superimposed stack of cut strips in said strip stacker to secure said strips to one another.
14. A method according to any preceding claim, characterised in that the strip feeding rate is continuous, and the cutter is synchronized to the feed rate of the continuous strip of material.
15. Apparatus for carrying out the method of claim 1, said apparatus comprising a supply of continuous strip material (15) having lines of adhesive thereon; a strip feeder (23,12) for feeding said strip material continuously longitudinally along a feed path and a cutter (25) positioned adjacent said feed path to sever said continuous strip into predetermined lengths (20), characterised in that an accelerator (28,29) is positioned downstream from said cutter (25) for accelerating the cut strips and in that a stacker (32) is provided for receiving and stacking the cut strips in superimposed relation with the previously stacked strips.
16. Apparatus according to claim 15, characterised in that the stacker comprises means (37) for pushing the cut strip in superimposed relation to the previously stacked strips.

17. Apparatus according to claim 16, characterised in that the stacker comprises laterally spaced side supports (33) defining a longitudinally extending pass-through slot which is narrower than the width of said cut strips (20) and a pusher (37) for pushing a strip delivered to said stacker through said pass-through slot to the previously stacked strips.
18. Apparatus according to claim 17, characterised in that the stacker is provided with a receptacle (40) for receiving the processed strips.
19. Apparatus according to any one of claims 15 to 18, characterised in that the accelerator (28,29) is spaced from the cutter (25) a distance such that the leading edge of the next cut strip is grabbed by the accelerator substantially at the time that the cutter is activated to cut the trailing edge of said strip.
20. Apparatus according to any one of claims 15 to 19, characterised in that the apparatus has been further provided with an applicator (13) for applying glue to the strip material (10) prior to the strip material being cut by the cutter (25).
21. Apparatus according to any one of claims 15 to 20, characterised in that the accelerator transports the cut strip material at a speed which is faster than the speed at which the strip material is fed by the strip feeder to the cutter.
22. Apparatus according to claim 21, characterised in that the speed of the accelerator is such that sufficient time is made available to process the previous strip in the stacker before the next strip is introduced in the stacker.
23. Apparatus according to any one of claims 15 to 22, characterised in that successive cut strips are fed to the stacker at spaced instants of time.
24. Apparatus according to any one of claims 15 to 23, characterised in that means (35,37) are provided in the stacker for stopping and subsequently pushing a cut strip in superimposed relation to the previous stacked strips.
25. Apparatus according to claim 24, characterised in that the stopping means (35) are provided above a conveyor (46) for discharging the strips.
26. Apparatus according to claim 25, characterised in that it further comprises a pair of grooved cylinders, with longitudinal parallel grooves, said cylinders being contra-rotatable about substantially horizontal axes, said grooves being aligned in



each indexed position with said feed path.

27. Apparatus according to any one of claims 15 to 26, characterised in that the accelerator comprises a pair of feed rolls rotating at a peripheral speed substantially greater than the strip feeder.

28. Apparatus according to any one of claims 15 to 27, characterised in that said cutter is operable in synchronism with said strip feeder, to provide predetermined lengths of cut strip.

Patentansprüche

1. Verfahren zur Herstellung einer ausdehnbaren Fensterabdeckung, enthaltend die Schritte der Zuführung eines durchgehenden Streifens (15) von Material mit wenigstens einer Klebstofflinie in Längsrichtung des durchgehenden Streifens längs eines Zuführweges und des Zerschneidens des durchgehenden Streifens in festgelegte Längen (20) mit Hilfe eines Messers (25), welches in Nähe des genannten Zuführweges angeordnet ist, gekennzeichnet durch die weiteren Schritte der Beschleunigung jedes geschnittenen Streifens beim Ablaufen unterhalb des genannten Messers zu einer Stapeleinrichtung (32), der Aufnahme des genannten geschnittenen Streifens in die genannte Stapeleinrichtung und des Übereinanderstapelns der genannten geschnittenen Streifen gegenüber den zuvor gestapelten Streifen sowie der Befestigung jedes Streifens mit Hilfe der genannten, wenigstens einen Klebstofflinie am zuvor gestapelten Streifen in der Stapeleinrichtung.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß der genannte geschnittene Streifen (20) in eine Position über den zuvor gestapelten Streifen geschoben wird.

3. Verfahren nach Anspruch 2, dadurch gekennzeichnet, daß die Stapeleinrichtung seitliche, in Abständen abgeordnete Seitenstützen (33) enthält, die einen in Längsrichtung verlaufenden Durchlaufschlitz bilden, der schmaler ist als die Breite der genannten geschnittenen Streifen (20), wobei ein geschnittener Streifen, der von der genannten Stapeleinrichtung (32) empfangen wurde, durch den genannten Durchlaufschlitz zu den zuvor gestapelten Streifen geschoben wird.

4. Verfahren nach Anspruch 3, dadurch gekennzeichnet, daß die Stapeleinrichtung (32) mit einem Behälter (40) zur Aufnahme der gestapelten Streifen versehen ist.

5. Verfahren nach einem der vorherigen Ansprüche, dadurch gekennzeichnet, daß jeder geschnittene Streifen (20) von einer Beschleunigungsvorrichtung (28, 29) erfaßt wird, die unterhalb des genannten Messers in einem Abstand angeordnet ist, wodurch jeder Streifen zu gleicher Zeit oder nach dem Zeitpunkt, wo er von dem durchgehenden Streifen (15) abgetrennt wird, wesentlich beschleunigt wird.

6. Verfahren nach einem der vorherigen Ansprüche, dadurch gekennzeichnet, daß vor dem Schneiden des Streifenmaterials durch das Messer (25) Klebstoff auf das Streifenmaterial (10, 15) aufgebracht wurde.

7. Verfahren nach einem der vorherigen Ansprüche, dadurch gekennzeichnet, daß die geschnittenen Streifen (20) von der Beschleunigungsvorrichtung (28, 29) mit einer Geschwindigkeit zugeführt werden, die größer ist als die Geschwindigkeit, mit der das Streifenmaterial (10, 15) durch einen Streifenspinner (23, 12) dem Messer zugeführt wird.

8. Verfahren nach Anspruch 7, dadurch gekennzeichnet, daß ausreichend Zeit zur Verfügung gestellt wird, um den vorherigen Streifen in der Stapeleinrichtung (32) zu bearbeiten, bevor der nächste Streifen in die Stapeleinrichtung eingeführt wird.

9. Verfahren nach einem der vorherigen Ansprüche, dadurch gekennzeichnet, daß aufeinanderfolgende geschnittene Streifen (20) der Stapeleinrichtung (32) in bestimmten Zeitabständen zugeführt werden.

10. Verfahren nach einem der vorherigen Ansprüche, dadurch gekennzeichnet, daß sich der beschleunigte Streifen in einer bestimmten Position am genannten Weg befindet und daß jeder Streifen anschließend mittels der genannten, wenigstens einen Klebstofflinie an einem anderen Teil der genannten Fensterabdeckung befestigt wird, während sich der genannte Streifen in der genannten Position befindet.

11. Verfahren nach Anspruch 10, dadurch gekennzeichnet, daß der nächste geschnittene Streifen unterhalb des genannten Messers nur beschleunigt wird, nachdem sich der genannte vorherige Streifen in der genannten festgelegten Position befunden hat.

12. Verfahren nach einem der vorherigen Ansprüche, dadurch gekennzeichnet, daß der durchgehende Streifen einen vorgefalteten Material-



streifen enthält.

13. Verfahren nach einem der vorherigen Ansprüche, dadurch gekennzeichnet, daß auf den Stapel übereinanderliegender geschnittener Streifen in der genannten Streifenstapeleinrichtung ein Druck ausgeübt wird, um die genannten Streifen miteinander zu verbinden. 5
14. Verfahren nach einem der vorherigen Ansprüche, dadurch gekennzeichnet, daß die Streifenzuführgeschwindigkeit kontinuierlich ist und das Messer mit der Zuführgeschwindigkeit des durchgehenden Materialstreifens synchronisiert ist. 10
15. Apparat zur Durchführung des Verfahrens nach Anspruch 1, wobei der genannte Apparat einen Vorrat von durchgehendem Streifenmaterial (15) mit darauf befindlichen Klebstofflinien enthält, einen Streifenspeiser (23, 12) für die kontinuierliche Zuführung des genannten Streifenmaterials in Längsrichtung entlang eines Zuführweges, und ein Messer (25), welches neben dem genannten Zuführweg angeordnet ist, um den genannten durchgehenden Streifen in festgelegte Längen (20) zu zerschneiden, dadurch gekennzeichnet, daß unterhalb des genannten Messers (25) eine Beschleunigungsvorrichtung (28, 29) zur Beschleunigung der geschnittenen Streifen angeordnet ist und daß eine Stapeleinrichtung (32) für das Aufnehmen und Stapeln der geschnittenen Streifen über den zuvor gestapelten Streifen vorhanden ist. 15
16. Apparat nach Anspruch 15, dadurch gekennzeichnet, daß die Stapeleinrichtung Mittel (37) enthält, mit denen der geschnittene Streifen über die zuvor gestapelten Streifen geschoben wird. 20
17. Apparat nach Anspruch 16, dadurch gekennzeichnet, daß die Stapeleinrichtung seitliche, in einem Abstand angeordnete Seitenstützen (33) enthält, die einen in Längsrichtung verlaufenden Durchlaufschlitz definieren, der schmaler ist als die Breite der genannten geschnittenen Streifen (20), sowie eine Schiebevorrichtung (37) zum Durchschieben eines der Stapeleinrichtung zugeführten Streifens durch den genannten Durchlaufschlitz zu den zuvor gestapelten Streifen. 25
18. Apparat nach Anspruch 17, dadurch gekennzeichnet, daß die Stapeleinrichtung mit einem Behälter (40) für die Aufnahme der bearbeiteten Streifen versehen ist. 30
19. Apparat nach einem der Ansprüche 15 bis 18, dadurch gekennzeichnet, daß die Beschleunigungsvorrichtung (28, 29) in einem solchen Ab- 35

stand vom Messer (25) angeordnet ist, daß die Vorderkante des nächsten geschnittenen Streifens von der Beschleunigungsvorrichtung im wesentlichen zu dem Zeitpunkt erfaßt wird, wo das Messer aktiviert wird, um die hintere Kante des genannten Streifens zu schneiden.

20. Apparat nach einem der Ansprüche 15 bis 19, dadurch gekennzeichnet, daß der Apparat weiterhin mit einer Auftragvorrichtung (13) für das Auftragen von Leim auf das Streifenmaterial (10) versehen ist, bevor das Streifenmaterial durch das Messer (25) geschnitten wird. 40
21. Apparat nach einem der Ansprüche 15 bis 20, dadurch gekennzeichnet, daß die Beschleunigungsvorrichtung das geschnittene Streifenmaterial mit einer Geschwindigkeit transportiert, die größer ist als die Geschwindigkeit, mit der das Streifenmaterial vom Streifenspeiser dem Messer zugeführt wird. 45
22. Apparat nach Anspruch 21, dadurch gekennzeichnet, daß die Geschwindigkeit der Beschleunigungsvorrichtung so beschaffen ist, daß ausreichend Zeit zur Verfügung gestellt wird, um den vorhergehenden Streifen in der Stapeleinrichtung zu bearbeiten, bevor der nächste Streifen in die Stapeleinrichtung eingeführt wird. 50
23. Apparat nach einem der Ansprüche 15 bis 22, dadurch gekennzeichnet, daß aufeinanderfolgende geschnittene Streifen der Stapeleinrichtung in zeitlichen Abständen zugeführt werden. 55
24. Apparat nach einem der Ansprüche 15 bis 23, dadurch gekennzeichnet, daß in der Stapeleinrichtung Mittel (35, 37) zum Anhalten und anschließenden Schieben eines geschnittenen Streifens in eine Lage über den zuvor gestapelten Streifen vorgesehen sind. 60
25. Apparat nach Anspruch 24, dadurch gekennzeichnet, daß die Anhaltmittel (35) über einem Förderband (46) zur Abführung der Streifen angebracht sind. 65
26. Apparat nach Anspruch 25, dadurch gekennzeichnet, daß er weiterhin ein Paar genuteter Zylinder mit in Längsrichtung parallel verlaufenden Nuten enthält, wobei die genannten Zylinder im wesentlichen um die gleichen horizontalen Achsen in Gegenrichtung gedreht werden können, während die genannten Nuten in jeder Schaltposition mit dem genannten Zuführweg fluchten. 70
27. Apparat nach einem der Ansprüche 15 bis 26, dadurch gekennzeichnet, daß die Beschleunig- 75



gungsvorrichtung ein Paar Zuführrollen enthält, die mit einer Umfangsgeschwindigkeit rotieren, welche im wesentlichen größer ist als die des Streifenspeisers.

28. Apparat nach einem der Ansprüche 15 bis 27, dadurch gekennzeichnet, daß das genannte Messer synchron mit dem genannten Streifenspeiser betätigt werden kann, um festgelegte Längen von geschnittenen Streifen zu bilden.

Revendications

1. Procédé de fabrication d'un habillage de fenêtre extensible comprenant les étapes d'introduction d'une bande continue (15) de matériaux contenant au moins une ligne d'adhésif dans la direction longitudinale de la bande continue le long de la trajectoire d'introduction, et de coupe de la bande continue de longueurs prédéterminées (20), au moyen d'un dispositif de coupe (25) positionné de manière contiguë à la trajectoire d'introduction, caractérisé par les étapes suivantes, consistant à accélérer chaque bande coupée lorsqu'elle passe vers le bas du dispositif de coupe à une empileuse (32), à recevoir la bande coupée dans l'empileuse et à empiler les bandes coupées dans une relation de superposition avec les bandes précédemment empilées, et à fixer chaque bande au moyen au moins d'une ligne d'adhésifs à la bande précédemment empilée dans l'empileuse.
2. Procédé, selon la revendication 1, caractérisé en ce que la bande coupée (20) est comprimée dans une relation de superposition sur les bandes précédemment empilées.
3. Procédé, selon la revendication 2, caractérisé en ce que l'empileuse contient des supports latéraux (33) espacés latéralement, définissant une encoche de passage s'étendant longitudinalement, de largeur inférieure à la largeur des bandes coupées (20), dans laquelle une bande coupée qui est réceptionnée par l'empileuse (32) est comprimée à travers l'encoche de passage sur les bandes précédemment empilées.
4. Procédé, selon la revendication 3, caractérisé en ce que l'empileuse (32) est munie d'un réceptacle (40) de manière à recevoir les bandes empilées.
5. Procédé, selon les revendications précédentes, caractérisée en ce que chaque bande coupée (20) est entraînée par un accélérateur (28, 29) espacé en aval du dispositif de coupe, d'où il résulte que chaque bande est accélérée pratiquement au

même moment, ou juste après le moment, où elle est détachée de la bande continue (15).

6. Procédé selon les revendications précédentes, caractérisée en ce que l'adhésif est appliqué au matériau en bandes (10, 15) avant que le matériau ne soit coupé en bandes par le dispositif de coupe (25).
7. Procédé, selon les revendications précédentes, caractérisé en ce que les bandes coupées (20) sont introduites par l'accélérateur (28, 29) à une vitesse qui est supérieure à la vitesse à laquelle le matériau en bandes (10, 15) est introduit par un dispositif d'introduction de bandes (23, 12) au dispositif de coupe.
8. Procédé, selon la revendication 7, caractérisé en ce que l'on dispose de suffisamment de temps pour traiter la bande précédente dans l'empileuse (32) avant que la bande suivante ne soit introduite dans l'empileuse.
9. Procédé, selon les revendications précédentes, caractérisé en ce que des bandes coupées successives coupées (20) sont introduites sur l'empileuse (32) à des instants espacés.
10. Procédé, selon les revendications précédentes, caractérisé en ce que la bande accélérée est située à une position prédéterminée sur le trajet et en ce que chaque bande est ultérieurement fixée au moyen d'au moins une ligne d'adhésif à une autre partie de l'habillage de fenêtre lorsque la bande est dans la position.
11. Procédé, selon la revendication 10, caractérisée en ce que la bande coupée suivante est accélérée en aval du dispositif de coupe seulement après que la bande précédente ait été positionnée dans la position prédéterminée.
12. Procédé, selon les revendications précédentes, caractérisée en ce qu'une bande continue est une bande préplissée, prépliée de matériaux.
13. Procédé, selon les revendications précédentes, caractérisée en ce qu'une pression est appliquée sur l'empilement superposé de bandes coupées dans l'empileuse de bandes afin d'immobiliser les bandes les unes aux autres.
14. Procédé, selon les revendications précédentes, caractérisée en ce que la vitesse d'introduction de la bande est continue, et le dispositif de coupe est synchronisé à la vitesse d'introduction de la bande continue de matériaux.



15. Dispositif de réalisation du procédé, selon la revendication 1, l'appareil comprenant un dispositif de fourniture d'un matériau en bandes continues (15) possédant des lignes d'adhésifs sur sa surface ; un dispositif d'introduction de bandes (23, 12) afin d'introduire le matériau en bandes de manière continue, longitudinalement le long de la trajectoire d'introduction et un dispositif de coupe (25) positionné de manière adjacente à la trajectoire d'introduction afin de séparer la bande continue en des bandes de longueurs prédéterminées (20), caractérisé en ce qu'un accélérateur (28, 29) est positionné en aval du dispositif de coupe (25) de manière à accélérer les bandes coupées et en ce qu'une empileuse (32) est conditionnée afin de recevoir et d'empiler les bandes coupées dans une relation de superposition avec les bandes empilées préalablement.
16. Dispositif selon la revendication 15, caractérisé en ce que l'empileuse comprend des moyens (37) de compression de la bande coupée dans une relation de superposition sur les bandes empilées précédemment.
17. Dispositif, selon la revendication 16, caractérisé en ce que l'empileuse comprend des supports latéraux (33) espacés latéralement, définissant une encoche de passage s'étendant longitudinalement, qui est de dimension plus étroite que la largeur des bandes coupées (20) et un dispositif de compression (37) pour comprimer une bande fournie à l'empileuse à travers l'encoche de passage sur les bandes empilées préalablement.
18. Dispositif, selon la revendication 17, caractérisé en ce que l'empileuse est munie d'un réceptacle (40) pour recevoir les bandes traitées.
19. Dispositif, selon l'une des revendications 15 à 18, caractérisé en ce que l'accélérateur (28, 29) qui est espacé du dispositif de coupe (25) d'une distance telle que l'amorce de la bande coupée suivante soit saisie par l'accélérateur pratiquement au moment où le dispositif de coupe est activé de manière à couper le bord arrière de la bande.
20. Dispositif, selon l'une des revendications 15 à 19, caractérisé en ce que le dispositif est de plus muni d'un applicateur (13) pour appliquer de la colle sur le matériau en bandes (10) avant que le matériau en bandes ne soit coupé par le dispositif de coupe (25).
21. Dispositif, selon l'une des revendications 15 à 20, caractérisé en ce que l'accélérateur transporte le matériau en bandes coupées à une vitesse qui est plus rapide que la vitesse par laquelle le matériau en bandes est introduit par le dispositif d'introduction de bandes au dispositif de coupe.
22. Dispositif, selon la revendication 21, caractérisé en ce que la vitesse de l'accélérateur est telle qu'on dispose de suffisamment de temps pour traiter la bande précédente dans l'empileuse avant que la bande suivante ne soit introduite dans l'empileuse.
23. Dispositif, selon l'une des revendications 15 à 22, caractérisé en ce que des bandes coupées successives sont introduites dans l'empileuse à des instants espacés.
24. Dispositif, selon l'une des revendications 15 à 23, caractérisé en ce que des moyens (35, 37) sont proposés dans l'empileuse pour arrêter et ultérieurement comprimer une bande coupée dans une relation de superposition sur les bande précédemment empilées.
25. Dispositif, selon la revendication 24, caractérisé en ce que des moyens d'arrêt (35) sont aménagés au-dessus du convoyeur (46) pour décharger les bandes.
26. Dispositif, selon la revendication 25, caractérisé en ce qu'il comprend de plus une paire de cylindres rainurés, les rainures étant longitudinales et parallèles, les cylindres étant entraînés dans leur rotation contraire autour des axes pratiquement horizontaux, les rainures étant alignées dans chaque position indexée avec la trajectoire d'introduction.
27. Dispositif, selon l'une des revendications 15 à 26, caractérisé en ce que l'accélérateur comprend une paire de roues d'introduction qui entraîne une rotation à une vitesse périphérique nettement plus grande que la vitesse d'introduction de bandes.
28. Dispositif, selon l'une des revendications 15 à 27, caractérisé en ce que le moyen de coupe peut fonctionner de manière synchronisée avec le moyen d'introduction de bandes, pour fournir des bandes coupées de longueurs prédéterminées.