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(54) **PROCESS AND APPARATUS FOR MANUFACTURING A HONEYCOMB COMPOSITE MATERIAL**

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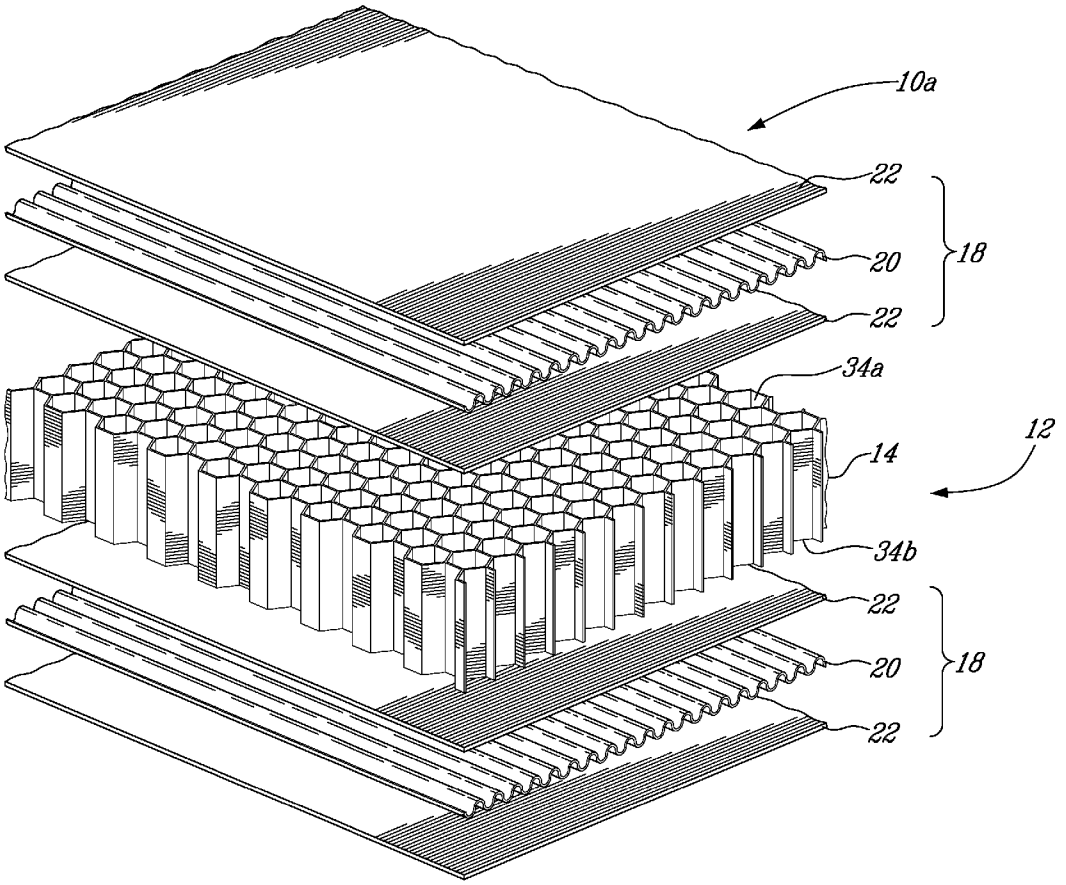
(52) **U.S. Cl.** **156/499**; 156/549

(57) **ABSTRACT**

An apparatus for a continuous production of a web of a composite material includes at least one honeycomb material carrier for moving a web of honeycomb material along the apparatus; at least one face sheet material carrier for moving at least one web of a face sheet material along the apparatus, the face sheet material having a corrugated medium with a linerboard on at least one face thereof; and at least one laminator for adhesively applying the at least one web of the face sheet material to a face of the web of honeycomb material in an expanded state.



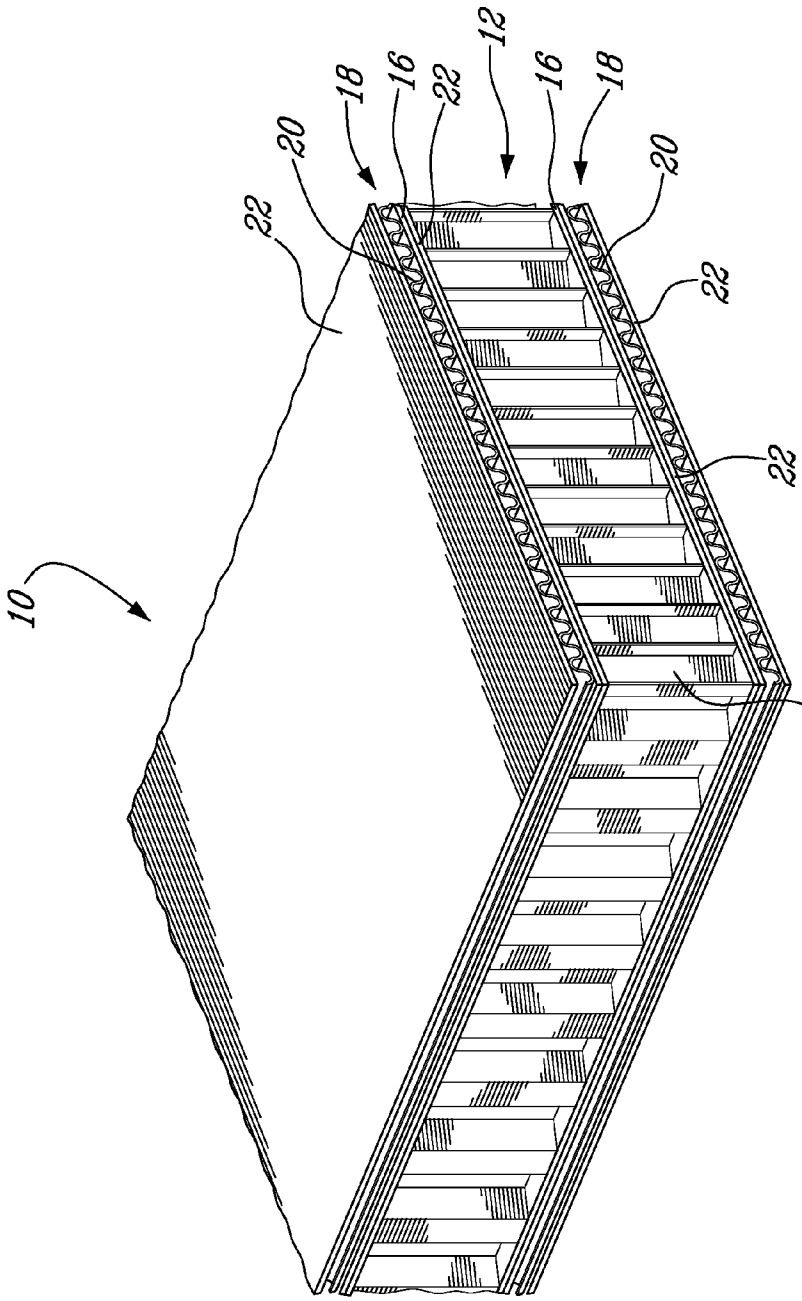


FIG. 1 (PRIOR ART)

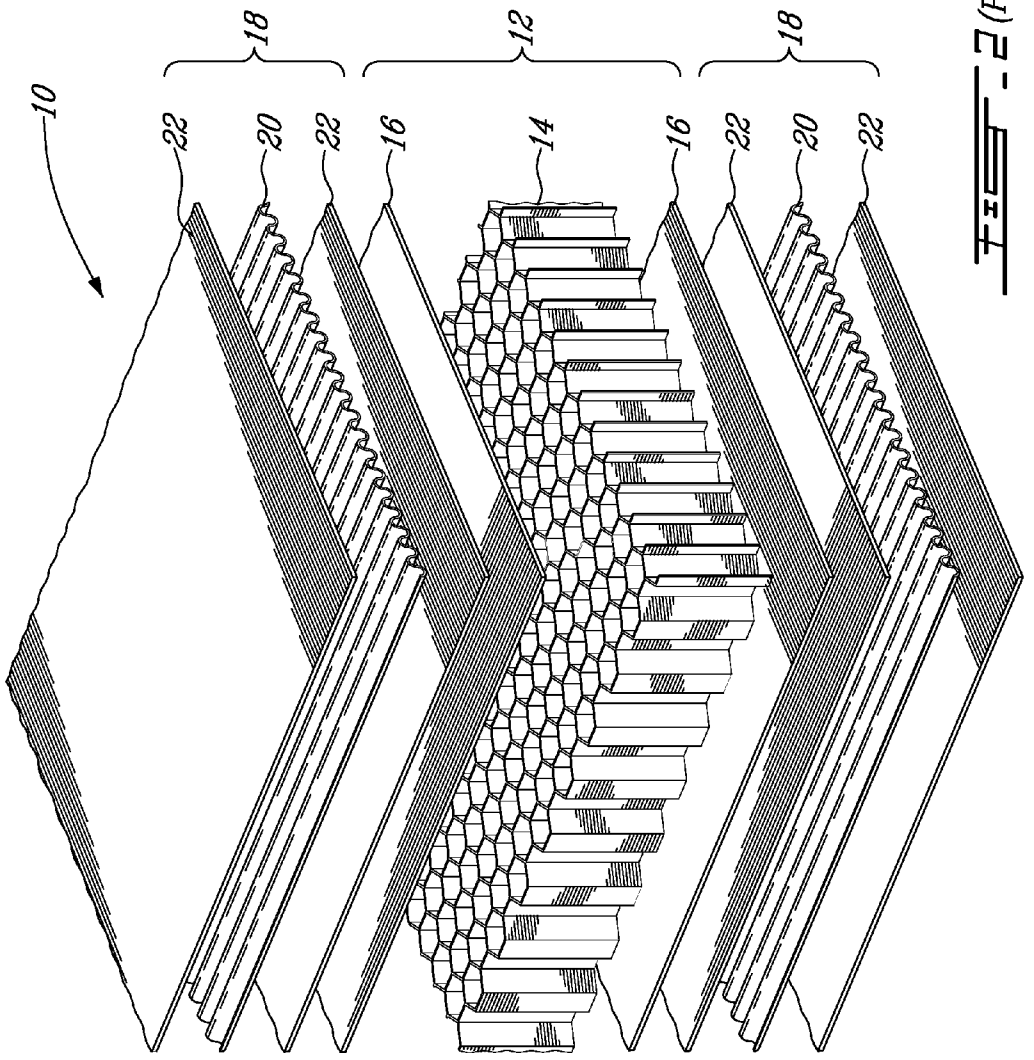


FIG. 2 (PRIOR ART)

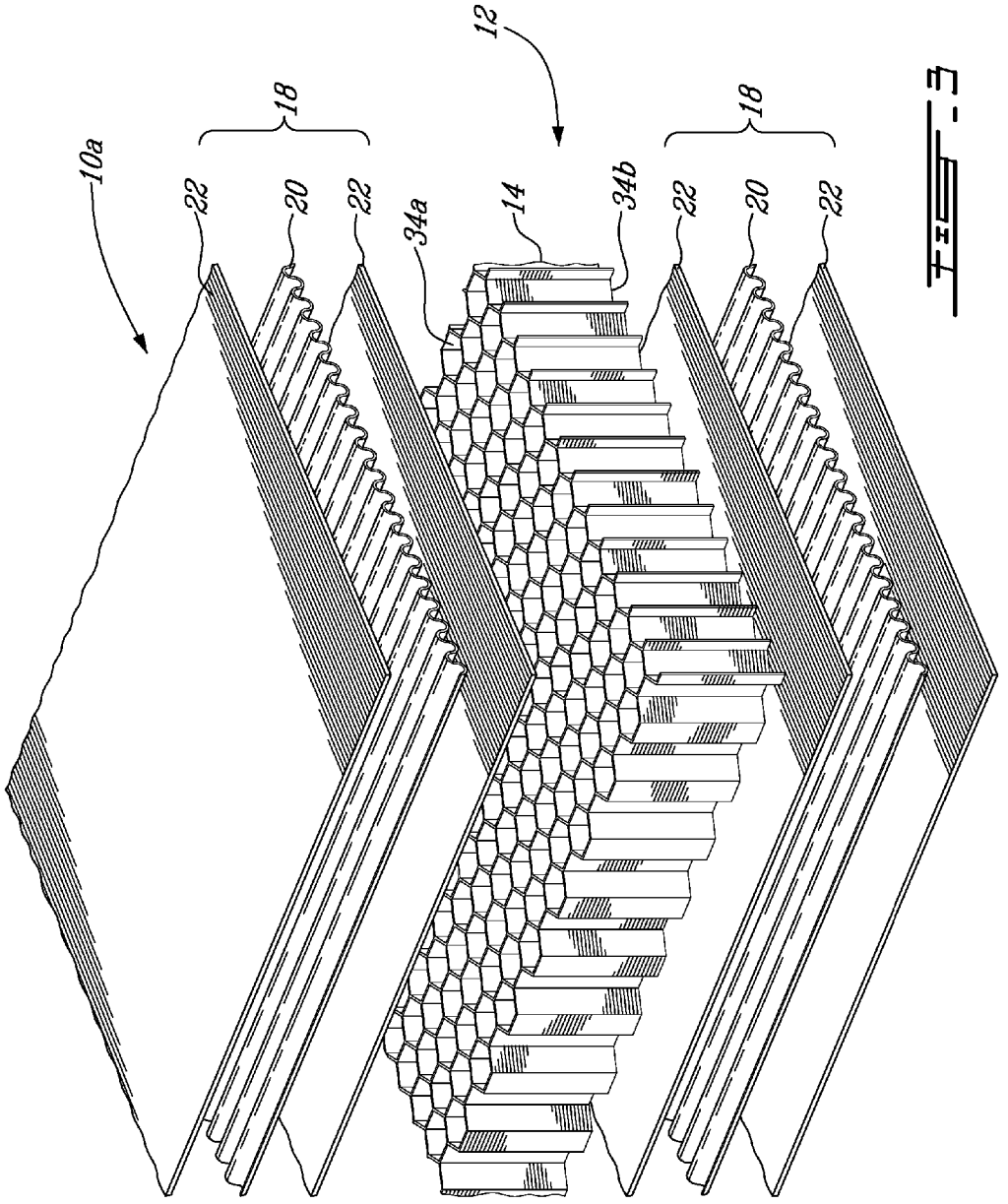


Fig. 3

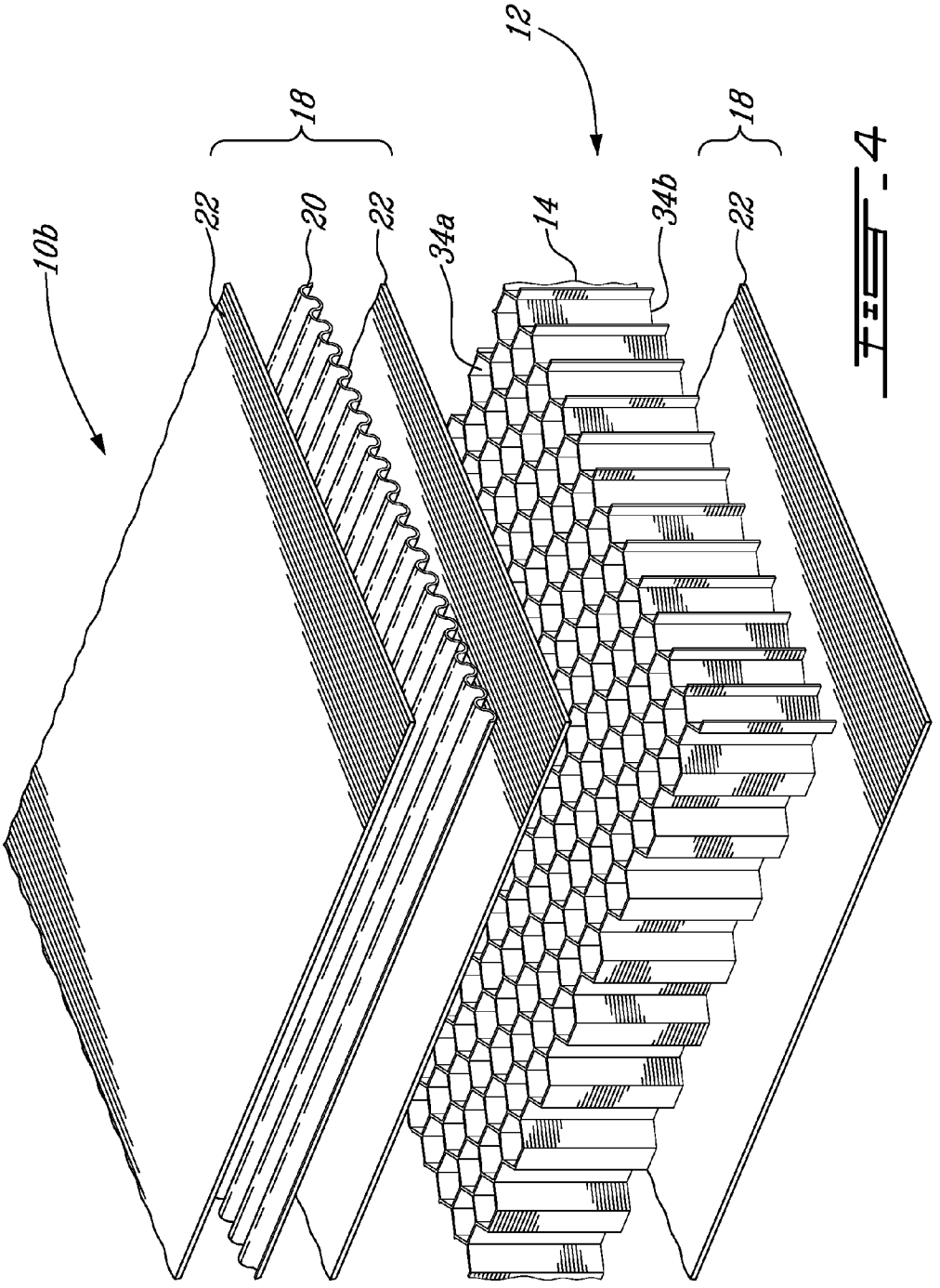


Fig. 4

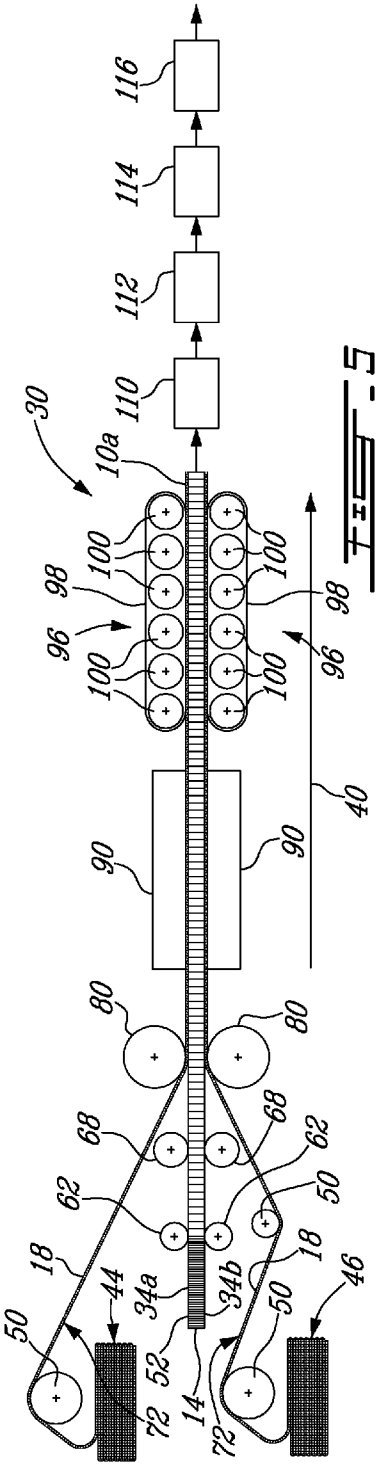
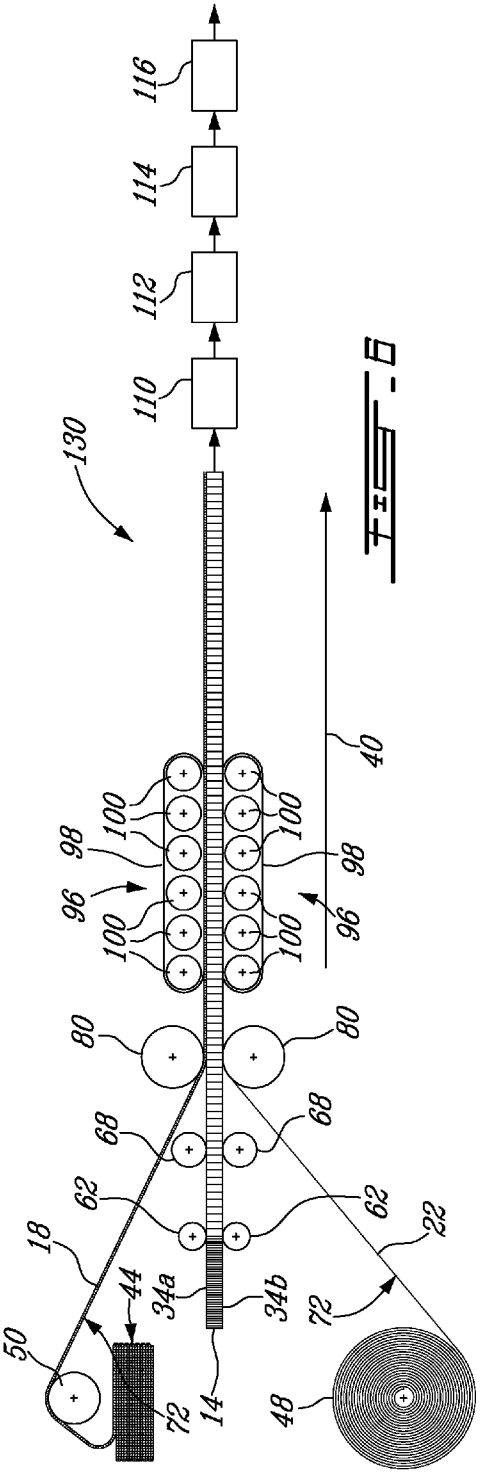

30
10a
110
112
114
116
96
98
100
90
40
80
68
62
50
18
44
34a
34b
52
14
72
46

Fig. 5


130
110
112
114
116
96
98
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40
80
68
62
18
44
34a
34b
72
14
22
48
50

Fig. 6

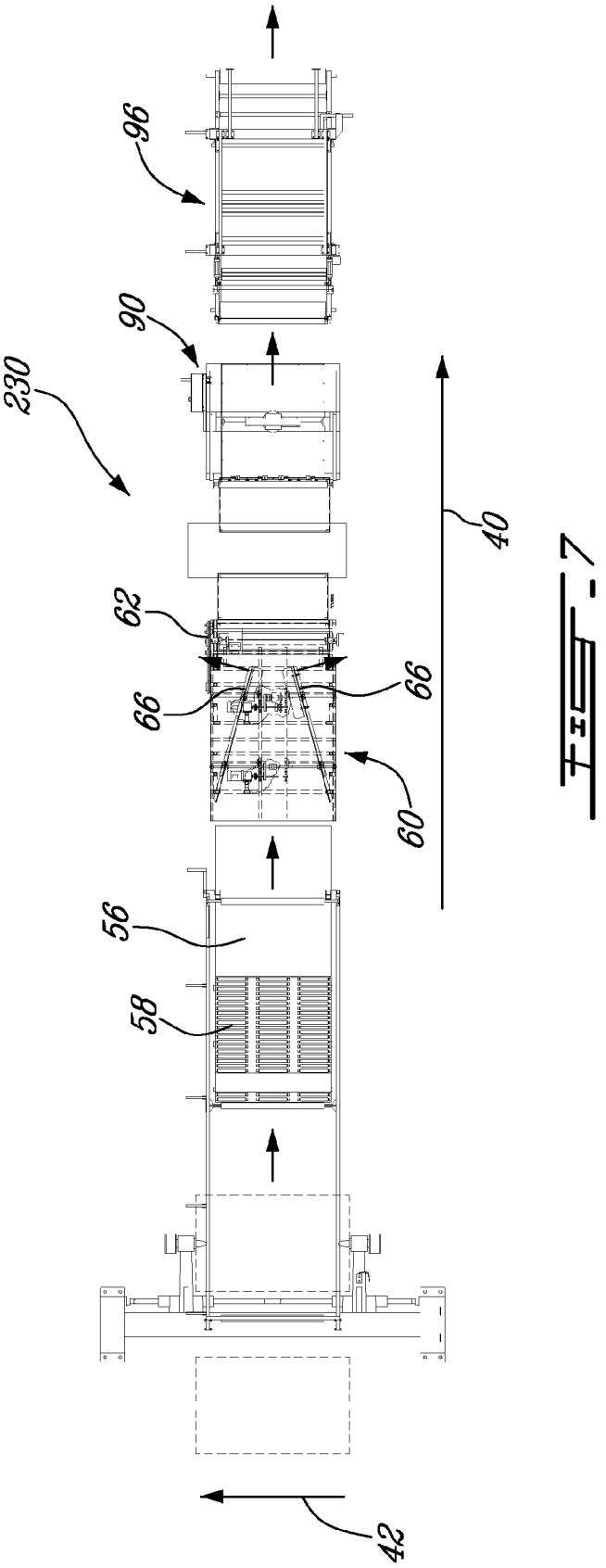
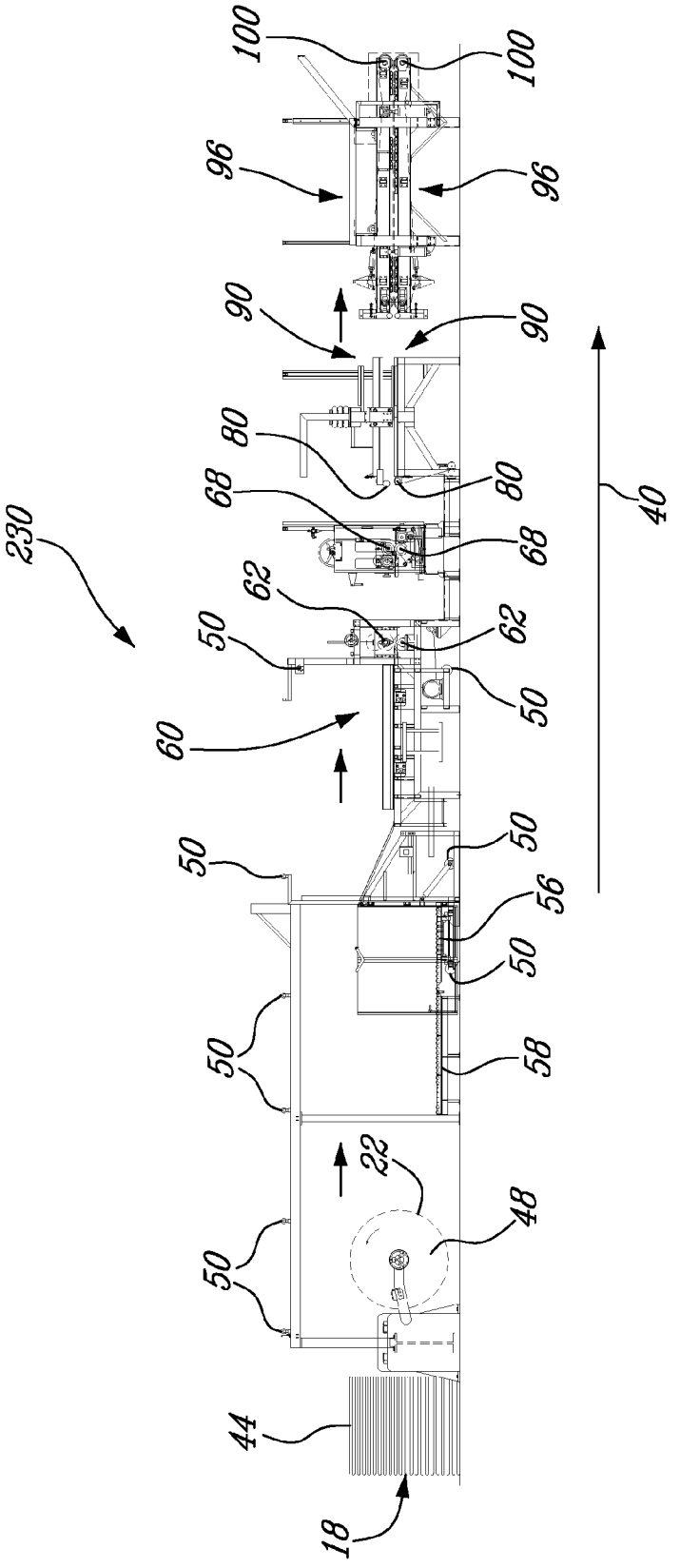


Fig. 7


100
100
96
96
90
90
80
80
68
68
62
62
50
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60
50
50
56
50
50
58
22
48
50
44
18
230
40

Fig. 8

PROCESS AND APPARATUS FOR MANUFACTURING A HONEYCOMB COMPOSITE MATERIAL

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a divisional of U.S. patent application Ser. No. 10/879,199, entitled "Process and Apparatus for Manufacturing a Honeycomb Composite Material", and which was filed Jun. 30, 2004 by applicants, the specification of which is hereby incorporated by reference.

FIELD OF THE INVENTION

[0002] The present invention relates to the field of manufacturing composite materials and, more particularly, to a process for manufacturing a honeycomb composite material and an apparatus to manufacture same. The composite material can be used for packaging and building applications, for instance.

BACKGROUND OF THE INVENTION

[0003] Safe product delivery requires a strong and efficient packaging material which can hold up under tough conditions. When selecting a packaging material, one typically considers its weight, its recyclability, its mechanical properties, and its cost.

[0004] Foam materials are widely used since they are inexpensive and lightweight. However they are typically not recognized as being environmentally friendly. Moreover, sometimes foam materials can generate static electricity when in contact with another object. Most paper honeycomb materials are fully recyclable, lightweight, and inexpensive. Honeycomb materials probably offer the best strength to weight ratio of packaging materials. However, they are characterized by a lower compressive strength in the plane of the material (edge compression resistance). Corrugated cardboards are also fully recyclable, lightweight, and inexpensive. However, important quantities of material are necessary to produce safe containers with corrugated cardboard, which increase the packaging cost. Moreover, corrugated cardboard having anti-static properties can be obtained.

[0005] Mass production of packaging materials calls for cost efficient and continuous productions to be competitive with existing products. Furthermore, higher than average mechanical properties are sought to allow reducing weight and lowering raw material cost.

SUMMARY OF THE INVENTION

[0006] According to one aspect of the present invention, there is provided a process for a continuous production of a web of a composite material. The process comprises the steps of: providing a web of honeycomb material; providing at least one web of face sheet material having a corrugated medium with at least one linerboard on at least one face thereof; carrying the web of honeycomb material and the at least one web of face sheet material along a production line; and adhesively applying the at least one web of face sheet material to one face of the honeycomb material while the honeycomb material is being conveyed through the production line and maintained in an expanded state.

[0007] According to another aspect of the present invention, there is provided a packaging material manufactured with the process described hereinabove.

[0008] According to a further aspect of the present invention, there is provided an apparatus for a continuous production of a web of a composite material. The apparatus comprises at least one honeycomb material carrier for moving a web of honeycomb material along the apparatus; at least one face sheet material carrier for moving at least one web of a face sheet material along the apparatus, the face sheet material having a corrugated medium with a linerboard on at least one face thereof; at least one laminator for adhesively applying the at least one web of the face sheet material to a face of the web of honeycomb material in an expanded state.

[0009] According to another aspect of the present invention, there is provided a packaging material manufactured with the apparatus described hereinabove.

[0010] The term paper is herein intended to means any wood fiber based material such as cardboard, kraft paper, recycled paper, medium, chipboard, bleached or not, and the like, for instance.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Further features and advantages of the present invention will become apparent from the following detailed description, taken in combination with the appended drawings, in which:

[0012] FIG. **1** is a perspective view of a manually manufactured composite material in accordance with the prior art;

[0013] FIG. **2** is an exploded perspective view of the composite material of FIG. **1**;

[0014] FIG. **3** is an exploded perspective view of a first embodiment of a composite material;

[0015] FIG. **4** is an exploded perspective view of a second embodiment of a composite material;

[0016] FIG. **5** is a schematic view of an example of a process for manufacturing the composite material in accordance with the first embodiment;

[0017] FIG. **6** is a schematic view of an example of a process for manufacturing the composite material in accordance with the second embodiment;

[0018] FIG. **7** is a top plan view of an apparatus for manufacturing a composite material; and

[0019] FIG. **8** is a side elevation view of the apparatus of FIG. **7**.

[0020] It will be noted that throughout the appended drawings, like features are identified by like reference numerals.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0021] Referring to FIGS. **1** and **2**, a composite material **10** typically used in packaging applications is shown. The composite material **10** has a core portion **12** including an expanded honeycomb material **14** and two linerboards **16** laminated on the honeycomb material **14**. The linerboards **16**

are used to maintain the honeycomb material **14** in an expanded state. On each linerboard **16**, a face sheet **18** is manually laminated. The face sheet **18** has a corrugated medium **20** and two linerboards **22**, one laminated on each side of the corrugated medium **20**. The composite material **10** has satisfactory mechanical properties for some packaging applications. However, since the face sheets **18** are laminated manually on the core portion **12**, it cannot be used widely due to its high manufacturing cost.

[**0022**] It is highly desirable to produce in a continuous manner a composite material such as the composite material described hereinabove, to reduce the manufacturing costs. Moreover, it is also desirable to reduce the raw material necessary to produce the composite material. When the composite material **10** is manufactured manually, two linerboards **16**, **22** are contiguous on each side of the honeycomb material **14**. As mentioned earlier, the linerboards **16** are necessary to maintain the honeycomb material **14** in an expanded state.

[**0023**] There is thus provided an apparatus to continuously manufacture a composite material similar to the composite material **10** and, in an embodiments, without the double linerboards **16**, **22** on each side of the honeycomb material **14**.

[**0024**] Referring to FIG. **3**, there is shown an example of honeycomb composite material **10***a* manufactured by a production line **30** (or a process line) such as shown in FIG. **5**. As the composite material **10**, the composite material **10***a* has a core portion **12** and two face sheets **18** laminated on the core portion **12**. In this example, the core portion **12** has a honeycomb material **14** in an expanded state. As opposed to the material shown in FIGS. **1** and **2**, the honeycomb material **14** is not covered with linerboards **16** laminated on each side of the honeycomb material **14**. The core portion **12** has two faces **34***a*, **34***b*. In this instance, the cells of the honeycomb material **14** have an hexagonal shape though any other suitable shape can be used. Each face sheet **18** includes of a corrugated medium **20** and two linerboards **22** laminated on each side of the corrugated medium **18**. In one embodiment, each face sheet **18** is directly laminated on the honeycomb material **14** forming the core portion **12** thereby reducing the raw material necessary to manufacture the composite material **10** shown in FIGS. **1** and **2**.

[**0025**] Further, the face sheets **18** can include a linerboard **22** laminated on a single side of the corrugated medium **20**, or alternately include a linerboard **22** laminated on each side of the corrugated medium. Either the corrugated medium **20** or the linerboard **22** can be laminated on the core portion **12**. Referring to FIG. **4**, it will be seen that the composite material **10***b* can also have only one face sheet **18** with a corrugated medium **20** laminated one face **34***a* of the core portion **12** without departing from the scope of the invention. The other face **34***b* of the core portion **12** can be covered with a linerboard **22** as shown in FIG. **4** or it can be left uncovered, for example.

[**0026**] As mentioned earlier, massive application of the honeycomb composite material requires a cost efficient and continuous production, especially for packaging applications to be competitive with the existing products.

[**0027**] Referring to FIG. **5**, there is shown an example of a production line **30** which can be used to manufacture the composite material **10***a* (FIG. **3**). The production line **30** has a longitudinal axis **40** and a transversal axis **42** (visible in FIG. **7**) which correspond to the longitudinal and transversal axis of the composite material **10***a* manufactured. The faces sheets **18** are provided in webs. Two stacks **44**, **46** of face sheet webs are provided, each face sheet **18** including a corrugated medium **20** and two linerboards **22** laminated on each side of the corrugated medium **20**. If the face sheets **18** are constituted of a corrugated medium **20** and one linerboard **22** laminated on one side of the corrugated medium **20**, the face sheets **18** can be provided in rolls (not shown) in an embodiment. Moreover, if the composite material **10***a* includes only one face sheet **18** including the corrugated medium **20**, the production line **30** has only one stack **44** or roll. If the core portion **12** of the composite material **10***a* has one face **34***a* covered with a face sheet **18** including the corrugated medium **20** and the other face **34***b* is covered with a linerboard **22**, a roll **48** (FIG. **6**) of linerboard **22** can be provided instead of a second stack **46** of face sheet **18**.

[**0028**] The production line **30** is continuously fed in face sheets **18** since the face sheets are provided in webs. A new roll or stack **44**, **46** is supplied to the production line **30** when the face sheet web **18** of a previous roll or stack **44**, **46** has been totally consumed. The face sheets **18** are carried along the production line **30** with carriers such as driven rolls, as it will be more described in details below.

[**0029**] The honeycomb material **14** is provided in a collapsed state to form the core portion **12**. The honeycomb material **14** is previously manufactured with a technology known by those skilled in the art. For example, collapsed blocks **52** of honeycomb material **14** can be obtained by printing glue lines on a plurality of flat sheets (not shown). A stack of these sheets can be made, the glue be cured, and slices be cut from these blocks **52**. To expand the honeycomb material **14**, the sheets are pulled apart in the direction perpendicular to the planes of the constituent strips, i.e. in the expansion direction, thus expanding into an open cellular state having, usually, an hexagonal cell configuration. However, for the production line **30**, the honeycomb material **14** is provided in a collapsed state since it does not have linerboards **16** laminated thereon to maintain it in the expanded state. Webs of honeycomb material **14** are continuously supplied to the production line **30**.

[**0030**] The web of honeycomb material **14** is provided in the collapsed state on pallets (not shown). The pallets carrying honeycomb material **14** are conveyed toward an hydraulic table **56** (FIGS. **7** and **8**) with a conveyor **58** (FIGS. **7** and **8**). The hydraulic table **56** moves vertically to adjust the height of the pallet. Furthermore, the hydraulic table **56** can tilt to a predetermined angle to facilitate the expansion of the honeycomb material **14**. In an embodiment, the hydraulic table **56** is tilted to a 30-degree angle.

[**0031**] The honeycomb material **14** is then expanded on an expanding table **60** (FIGS. **7** and **8**). The expanding table **60** is equipped with two expanding rolls **62**, which can be scored. Expanding rolls **62** are disposed on each side of the honeycomb material **14**. The height of the expanding rolls **62** can be adjusted in accordance with the thickness of the honeycomb material **14**. The expanding table **60** also includes two curved guides **66** (FIG. **7**). While going through the curved guides **66**, the width of the honeycomb material **14** is reduced and, in combination with the expand-

ing rolls **62**, the honeycomb material **14** is expanded. The expanding rolls **62** draw and expand to a predetermined degree the collapsed honeycomb material **14**. The expanding rolls **62** are driven rolls, in an embodiment, and carry the web of honeycomb material **30** along the production line **30**. Expanding rolls **62** also supply the expanded honeycomb material **14** to a pair of adhesive rolls **68** disposed on each side of the honeycomb material **14**.

[**0032**] The expanded honeycomb material **14** is then introduced between the two adhesive rolls **68** where an adhesive is applied on both faces **34***a*, **34***b* of the expanded honeycomb material **14**. Each adhesive roll **68** is continuously supplied in the adhesive to apply homogeneously a predetermined quantity of adhesive on each face **34***a*, **34***b* of the honeycomb material **14**. Any other technique known by those skilled in the art can be used to apply the adhesive on the faces **34***a*, **34***b* of the honeycomb material **14**. If the composite material **10***a* includes only one face sheet **18**, the adhesive is applied on only one face **34***a* of the expanded honeycomb material **14** and the face sheet **18** is applied on the face **34***a* wherein the adhesive has previously been applied. Moreover, one skilled in the art will appreciate that the adhesive can be applied on a face **22** of the face sheets **18**, the face **22** that is in contact with the honeycomb material **14**. However, in that case, the quantity of adhesive required to bond the face sheets **18** on the core portion **12** is typically more important.

[**0033**] The adhesive rolls **68** can be driven rolls to carry the web of honeycomb material **14** or the web of face sheets **18** along the production line **30**.

[**0034**] Both face sheets **18** are carried close to the honeycomb material **14** after adhesive rolls **68**, one face sheet **18** on each side of the honeycomb material **14**. The face sheets **18** circulate parallel to the honeycomb material **14**. The face sheets **18** are carried along with a plurality of rolls **50** disposed at various positions (only one is shown). Some of the rolls **50** can be driven rolls.

[**0035**] The face sheets **18** are laminated on the honeycomb material **14** with two insertion rolls **80**, one roll **80** disposed on each side of the honeycomb material **14**. As it is seen in FIG. **5**, each face sheet **18** is inserted between the insertion roll **80** and the honeycomb material **14**. The insertion roll **80** applies a slight pressure on the face sheet **18** and the honeycomb material **14** to create a link between both and produce the composite material **10***a* without excessively compressing any of them. Insertion rolls **80** can also be driven rolls to carry the web of composite material **10***a* along the production line **30**.

[**0036**] The composite material **10***a* can then circulate between two heating plates (not shown) wherein the adhesive is heated to activate its adhesive properties. For example, for PVA, the adhesive is heated to approximately 215° C. One heating plate can be disposed on each side of the composite material **10***a*. One skilled in the art will appreciate that the heating plates can be replaced by several heating systems and apparatus such as electric plates, steam plates, gas or electric infrared heaters, microwaves, and a warm air flow.

[**0037**] Thereafter, the composite material **10***a* goes between two compression conveyors **96** wherein the honeycomb material **14** and the face sheets **18** are maintained together permitting the adhesive to set. The composite material **10***a* is maintained in the compression conveyors **96** until the adhesive is sufficiently dried and an adequate bond is formed between honeycomb material **14** and face sheets **18**. One compression conveyor **96** disposed on each side of the composite material **10***a*. Each compression conveyor **96** has a rubber endless belt **98** mounted over a plurality of rolls **100**. In an embodiment, the width of the compression conveyors **96** is at least equal to the width of the composite material **10***a* and they are sufficiently long to permit to the adhesive to set. The pressure applied by both two compression conveyors **96** is small in order to provide a composite material **10***a* with a honeycomb material **14** that has not been excessively compressed. However, it is sufficient to maintain both face sheets **18** in continuous contact with the honeycomb material **14** to ensure an adequate adhesion of the composite material **10***a*. The compression conveyors can also be carriers that carries the web of composite material **10***a* along the production line **30**.

[**0038**] One skilled in the art will appreciate that even if the compression conveyors **96** are used to maintain the honeycomb material **14** in contact with the face sheets **18**, any other appropriate system can be used such as flat presses or a plurality of rolls disposed on each side of the composite material **10***a*. The system used to maintain the composite material **10***a* together until the adhesive is set can be cooled down to accelerate the adhesive setting. Infrareds can also be used to accelerate the adhesive setting.

[**0039**] Thereafter, the composite material **10***a* is sent to a trim cutter unit **110** wherein the trims of the composite material **10***a* are cut to obtain a composite material **10***a* having a predetermined width. It is followed with a longitudinal cutter unit **112** wherein the composite material **10***a* manufactured is cut longitudinally. If desired, it is also possible to cut grooves on-line to facilitate the folding of the composite material **10***a*. In a groove cutter unit **114**, a saw (not shown) cuts one face sheet **18** along a predetermined length and a wheel (not shown) is used to bend the composite material **10***a* at a predetermined angle, for instance 90°. It is followed with a transversal cutter unit **116** wherein pieces of the composite material **10***a* having a predetermined length are produced by cutting transversally the composite material **10***a* manufactured. As one skilled in the art will appreciate, the composite material **10***a* can be cut on-line or off-line and the order of the cutting operations (trim cutter unit **110**, longitudinal cutter unit **112**, groove cutter unit **114**, and transversal cutter unit **116**) can be interchanged.

[**0040**] Referring to FIG. **6**, it will be seen another embodiment of a production line **130** used to manufacture the composite material **10***b* (FIG. **4**) with a hot-melt adhesive process. A stack **44** of face sheet **18**, having a corrugated medium **20** and two linerboards **22** laminated on each side of the corrugated medium **20**, is provided to cover a first face **34***a* of the honeycomb material **14**. A roll **48** of linerboard **22** is also provided to cover the opposite face **34***b* of the honeycomb material **14**. As for the production line **30** (FIG. **5**), in the production line **130** of FIG. **6**, the face sheet **18** and the linerboard **22** are fed to the production line **130** with driven rolls. Each of the face sheet **18** and the linerboard **22** are provided on one particular side of the honeycomb material **14**. The honeycomb material **14** is provided in a collapsed state to form the core portion **12**. The honeycomb material **14** is supplied, expanded, and the adhesive is

applied in a similar manner than for the production line **30**. In this example, the adhesive applied is a hot melt adhesive that does not need to be activated with heat to have adhesive properties. The hot melt adhesive can be applied on both faces **34***a*, **34***b* of the expanded honeycomb material **14**. The face sheet **18** and the linerboard **22** are then applied on the expanded honeycomb material **14** similarly as for the production line **30** of FIG. **5**. Two compression conveyors **96** are used to maintain the face sheet **18** and the linerboard **22** in contact with the honeycomb material **14** during only few seconds since the hot melt adhesive dries rapidly. Therefore, the length of the compression conveyors **96** of production line **130** (FIG. **6**) can be shorter than the length of the compression conveyors **96** of production line **30** (FIG. **5**).

[**0041**] After processing, the composite material **10***a*, **10***b* can be sent to trim cutter unit **110**, followed with a longitudinal cutter unit **112**, and a groove cutter unit **114** where a saw cuts the face sheet **18** along a predetermined length and a wheel is used to bend the composite material **10***b* at a predetermined angle, for instance 90°. Finally, the composite material **10***b* is sent to a transversal cutter unit **116**. As mentioned earlier, one skilled in the art will appreciate that the composite material **10***a* can be cut on-line or off-line and the order of the cutting operations (trim cutter unit **110**, longitudinal cutter unit **112**, groove cutter unit **114**, and transversal cutter unit **116**) can be changed.

[**0042**] Referring simultaneously to FIGS. **7** and **8**, there is shown an apparatus **230** for manufacturing the composite material **10***b* (FIG. **4**) with the production line **30**. A stack **44** of face sheet **18**, having a corrugated medium **20** and two linerboards **22** laminated on each side of the corrugated medium **20**, is provided to cover a first face **34***a* of the honeycomb material. A roll **48** of linerboard **22** is also provided to cover the opposite face **34***b* of the honeycomb material (not shown). The face sheet **18** and the linerboard **22** are fed to the production line **30** with driven rolls. Each of the face sheet **18** and the linerboard **22** are provided on one respective side of the honeycomb material.

[**0043**] As for the production lines **30** and **130**, the honeycomb material is provided in the collapsed state on pallets that are conveyed toward the hydraulic table **56** with the conveyor **58**. The honeycomb material is then expanded on the expanding table **60**. The expanding table **60** is equipped with two expanding rolls **62** disposed on each side of the honeycomb material and two curved guides **66**. The expanding table **60** draws and expands to a predetermined degree the collapsed honeycomb material. Expanding rolls **62** also supply the expanded honeycomb material to a pair of adhesive rolls **68** disposed on each side of the honeycomb material. The adhesive rolls **68** apply the adhesive on both faces **34***a*, **34***b* of the expanded honeycomb material.

[**0044**] The face sheet **18** and the linerboard **22** are carried close to the honeycomb material after adhesive rolls **68**. The face sheet **18** and the linerboard **22** circulate parallel to the honeycomb material. The face sheet **18** and the linerboard **22** are carried along with a plurality of rolls **50** disposed at various positions (only one is shown). Some of the rolls **50** can be driven rolls.

[**0045**] The face sheet **18** and the linerboard **22** are laminated on the honeycomb material with two insertion rolls **80**, one roll **80** disposed on each side of the honeycomb material. As it is seen in FIG. **5**, the face sheet **18** and the linerboard **22** are inserted between a respective insertion roll **80** and the honeycomb material **14**. The composite material **10***a* can then circulate between two heating plates wherein the adhesive is heated to activate its adhesive properties.

[**0046**] Thereafter, the composite material **10***a* goes between two compression conveyors **96** wherein the honeycomb material and the face sheets **18** are maintained together permitting the adhesive to set. One compression conveyor **96** disposed on each side of the composite material **10***a*. Each compression conveyor **96** has a rubber endless belt **98** mounted over a plurality of rolls **100**. Then, the composite material **10***b* is sent to cutter units (not shown) described above.

[**0047**] The honeycomb material **14** can be corrugated honeycomb without departing from the scope of the invention. Furthermore, one skilled in the art will understand that the adhesive can be alternately applied on the face sheets.

[**0048**] The composite material produced with either the hot melt production line **130** or the conventional production line **30** can consist in any combination of at least one face sheet **18** having at least one corrugated medium **20** laminated on a honeycomb material **14**.

[**0049**] One skilled in the art will understand that any number of linerboards **16**, **22** or face sheets **18** can be laminated on the composite material **10***a*, **10***b*.

[**0050**] The composite material **10***a*, **10***b* can be used for packaging applications wherein at least a portion of a container as shown in FIG. **7** is made of the composite material.

[**0051**] The core portion **12**, the face sheets **18**, and the linerboard **22** can be made from material which may be readily recycled using commercially available technology such as wood fiber based materials (cardboard, kraft paper, recycled paper, medium, chipboard, bleached or not, and the like). The material can be impregnated with a resin to improve its resistance to water, grease or fire, its gas and vapor barrier properties, its non-slip properties, and the like.

[**0052**] The choice of the adhesive to join together the various components of the composite material **10***a*, **10***b* can also be made on the basis of recyclability. The adhesive must ensure a good adhesion of the core portion **12** and the face sheets **18** or the linerboard **22**, remain on the top of the honeycomb material, and bond relatively rapidly. Adhesives such as polyvinyl alcohol (PVA), stamp glue, dextrin, and polyurethane can be used to assembly the composite material **10**. Hot melt adhesives such as polyolefin and ethylene vinyl acetate (EVA) can also be used.

[**0053**] The composite material can be wholly recyclable. It can be used as a packaging material due to its high strength for resisting stresses and strains.

[**0054**] The embodiments of the invention described above are intended to be exemplary only. For example, a portion or the entirety of the wood fiber based materials forming the composite material can be covered with a metallic foil, such as an aluminum foil, or a polymer, such as polyethylene. The composite material can be used in building applications such as for walls, doors, tableaux, etc. The scope of the invention is therefore intended to be limited solely by the scope of the appended claims.

We claim:

1. An apparatus for a continuous production of a web of a composite material, said apparatus comprising:

at least one honeycomb material carrier for moving a web of honeycomb material along said apparatus;

at least one face sheet material carrier for moving at least one web of a face sheet material along said apparatus, said face sheet material having a corrugated medium with a linerboard on at least one face thereof; and

at least one laminator for adhesively applying said at least one web of said face sheet material to a face of said web of honeycomb material in an expanded state.

2. An apparatus as claimed in claim 1, further comprising an expanding mechanism for expanding said web of honeycomb material from a collapsed state to said expanded state.

3. An apparatus as claimed in claim 2, wherein said expanding mechanism comprises at least two expanding rolls.

4. An apparatus as claimed in claim 1, wherein said honeycomb material carrier comprises at least one driven roll.

5. An apparatus as claimed in claim 1, wherein said face sheet material carrier comprises at least one driven roll.

6. An apparatus as claimed in claim 1, wherein said laminator comprises at least one adhesive applicator for applying adhesive to at least one of said web of face sheet material and said web of honeycomb material.

7. An apparatus as claimed in claim 6, comprising at least one heater to activate said adhesive.

8. An apparatus as claimed in claim 7, wherein said at least one heater is selected from the group consisting of: an electric plate, a steam plate, a gas or an electric infrared heater, microwaves, and a warm air flow.

9. An apparatus as claimed in claim 6, wherein said adhesive applicator applies an adhesive to at least one face of said web of honeycomb material.

10. An apparatus as claimed in claim 1, wherein said at least one web of face sheet material comprises a linerboard on each face of the corrugated medium.

11. An apparatus as claimed in claim 1, wherein said honeycomb material carrier is a continuous carrier.

12. An apparatus as claimed in claim 1, wherein said face sheet material carrier is a continuous carrier.

13. An apparatus as claimed in claim 1, comprising a face sheet material feeder.

14. An apparatus as claimed in claim 13, wherein the face sheet material feeder comprises a feeding roll.

15. An apparatus as claimed in claim 6, wherein said adhesive applicator comprises two rolls defining a gap therebetween in which at least one of the honeycomb material web and the face sheet material web circulates.

16. An apparatus as claimed in claim 1, wherein the laminator comprises at least one of compression conveyors, flat presses, and rolls extending after the adhesive applicator.

17. An apparatus as claimed in claim 1, comprising a cutter unit extending after the laminator.

18. An apparatus as claimed in claim 17, wherein the cutter unit comprises at least one of a trim cutter unit, a longitudinal cutter unit, a groove cutter unit, and a transversal cutter unit.

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