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(54) EXTRUDED PLASTIC LUMBER AND METHOD OF MANUFACTURE

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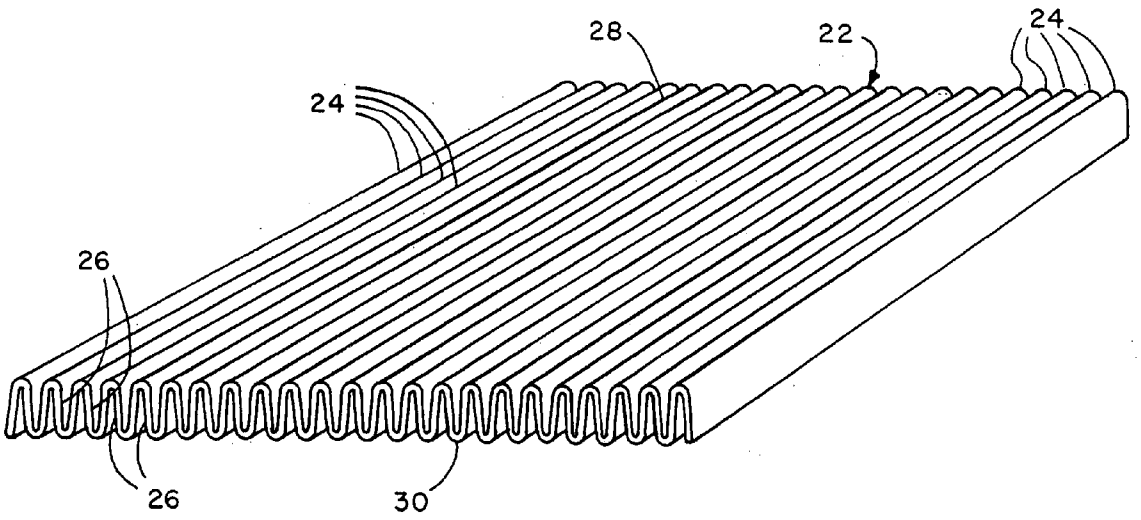
(57) **ABSTRACT**

A composite reinforced plastic lumber article, such as a board or a plank having a generally rectangular cross-section, is formed by extruding a wood particle/polymer composition through an extrusion die which forms a corrugated or relatively thin sheet cross-section core part. The core part is compressed to push corrugations closer together and then cooled in a two-stage cooling process with water spray and submersion followed by vacuum and air blast drying of the article, followed by extruding an outer coating of the same composition over the core part. A continuous plank-like composite article is thus formed and is cooled after the outer coating is extruded over the core part. Opposed surfaces of the article may be embossed to provide a woodgrain appearance. The two-stage article forming process provides more rapid cooling of the material to enhance the speed of production of reinforced plastic lumber articles and the like.



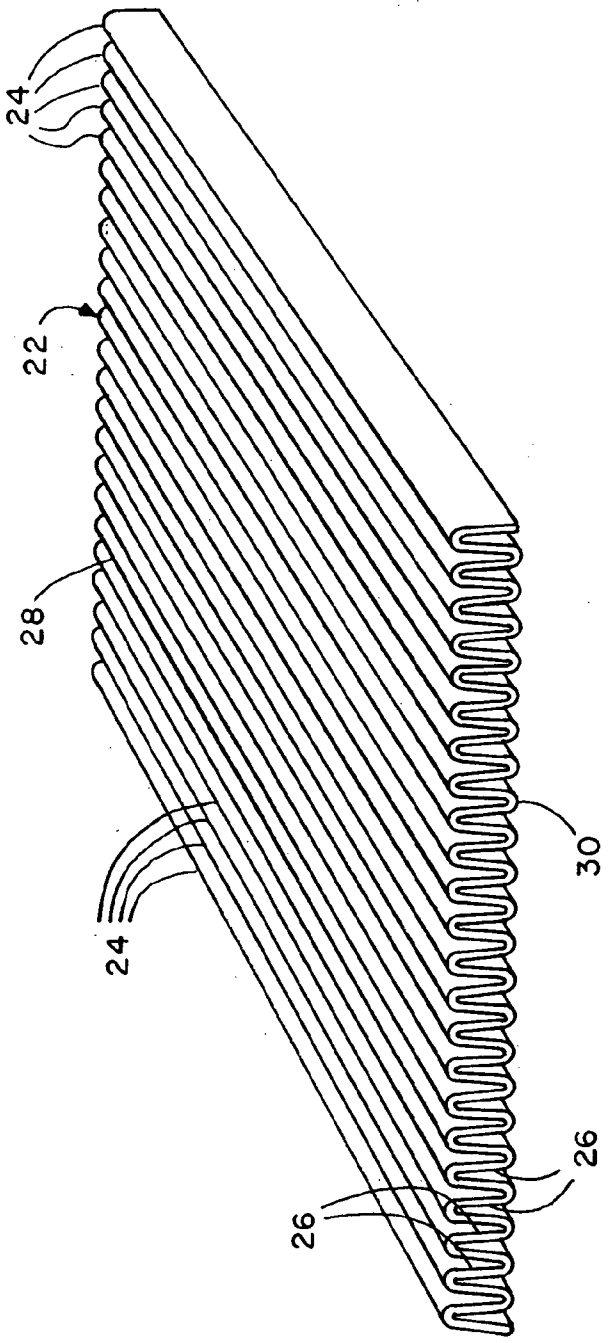


FIG. 1

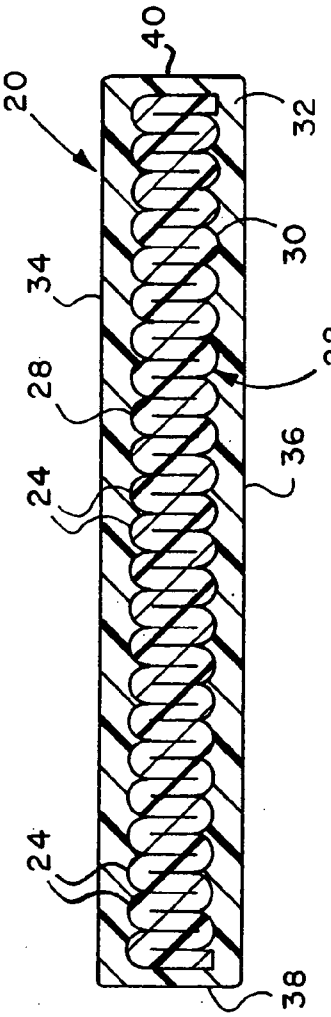


FIG. 2

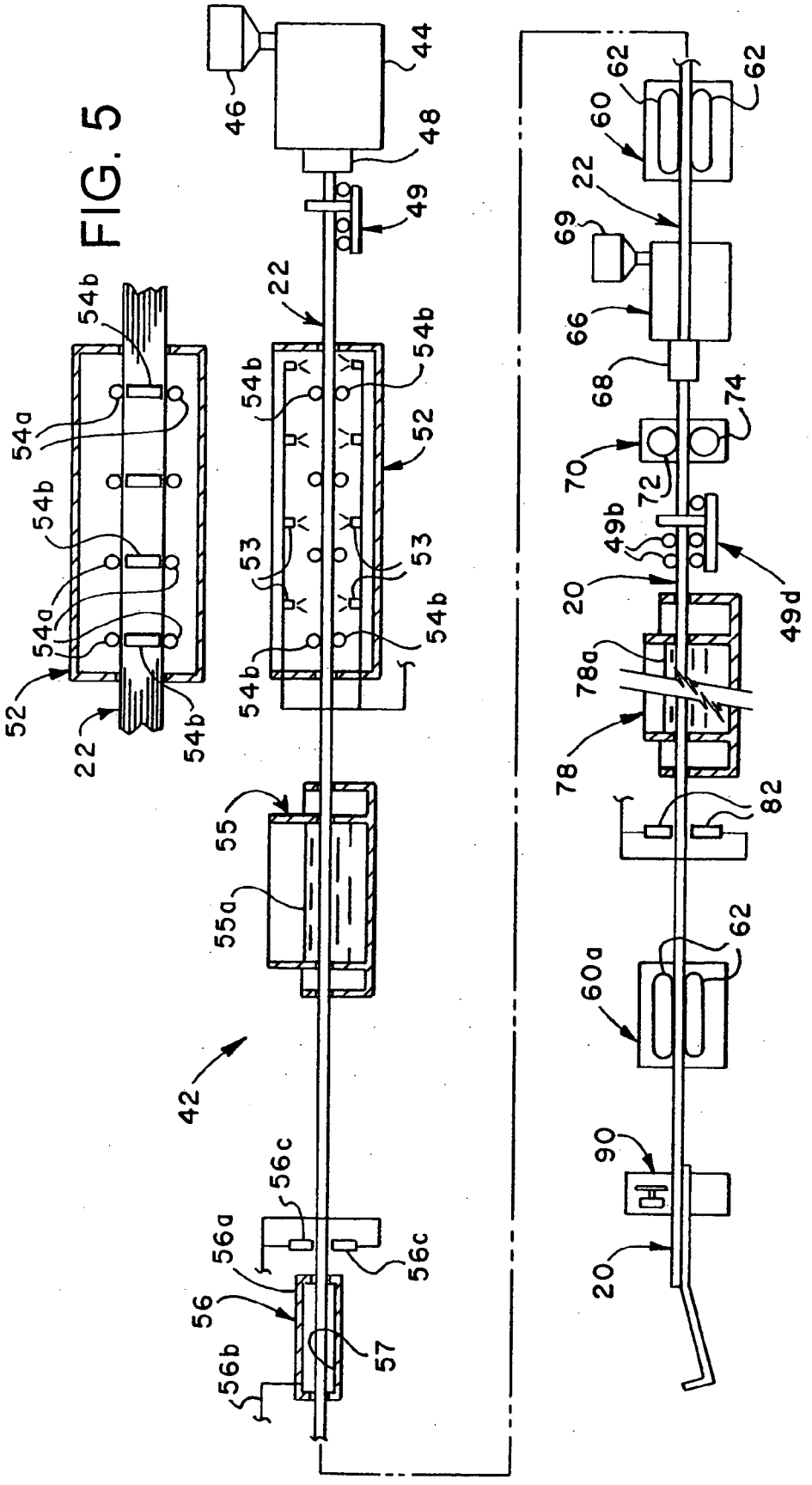

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FIG. 3

FIG. 5

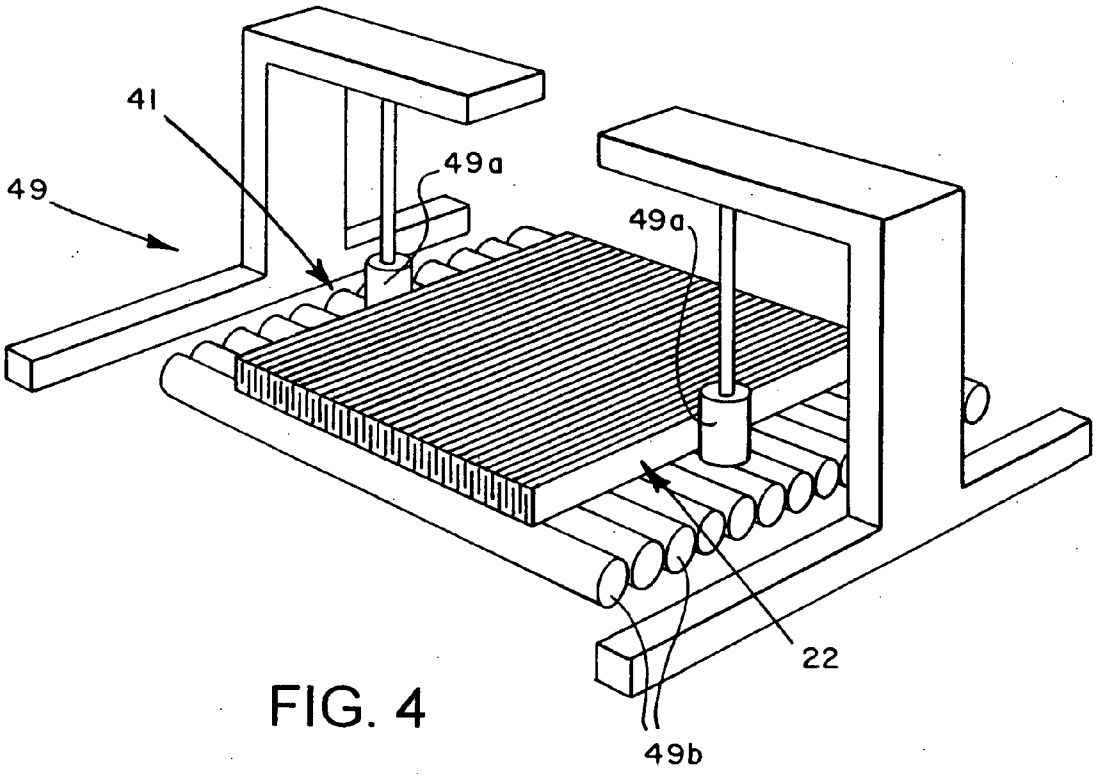

FIG. 4

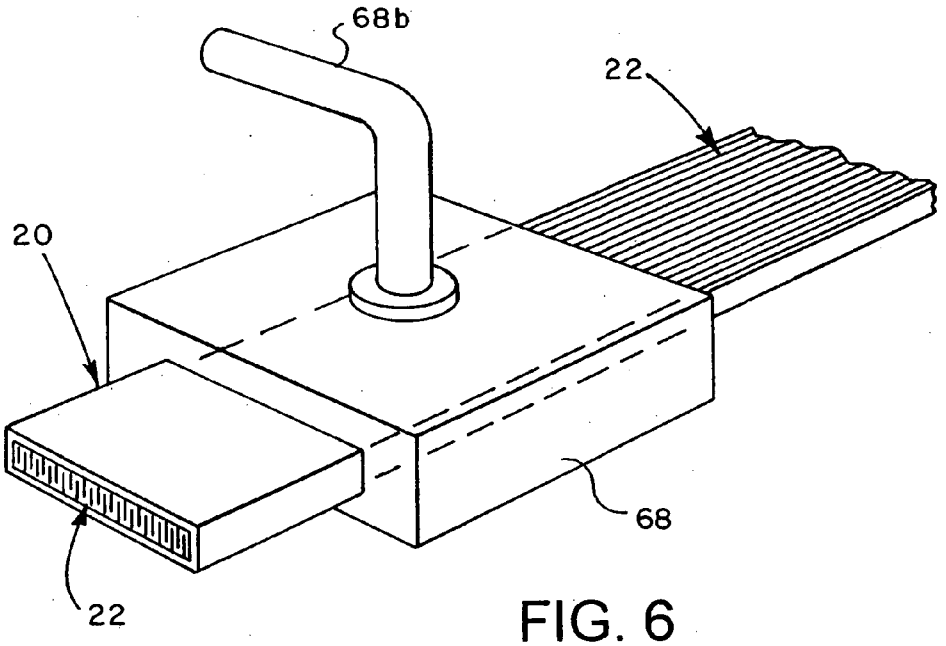

FIG. 6

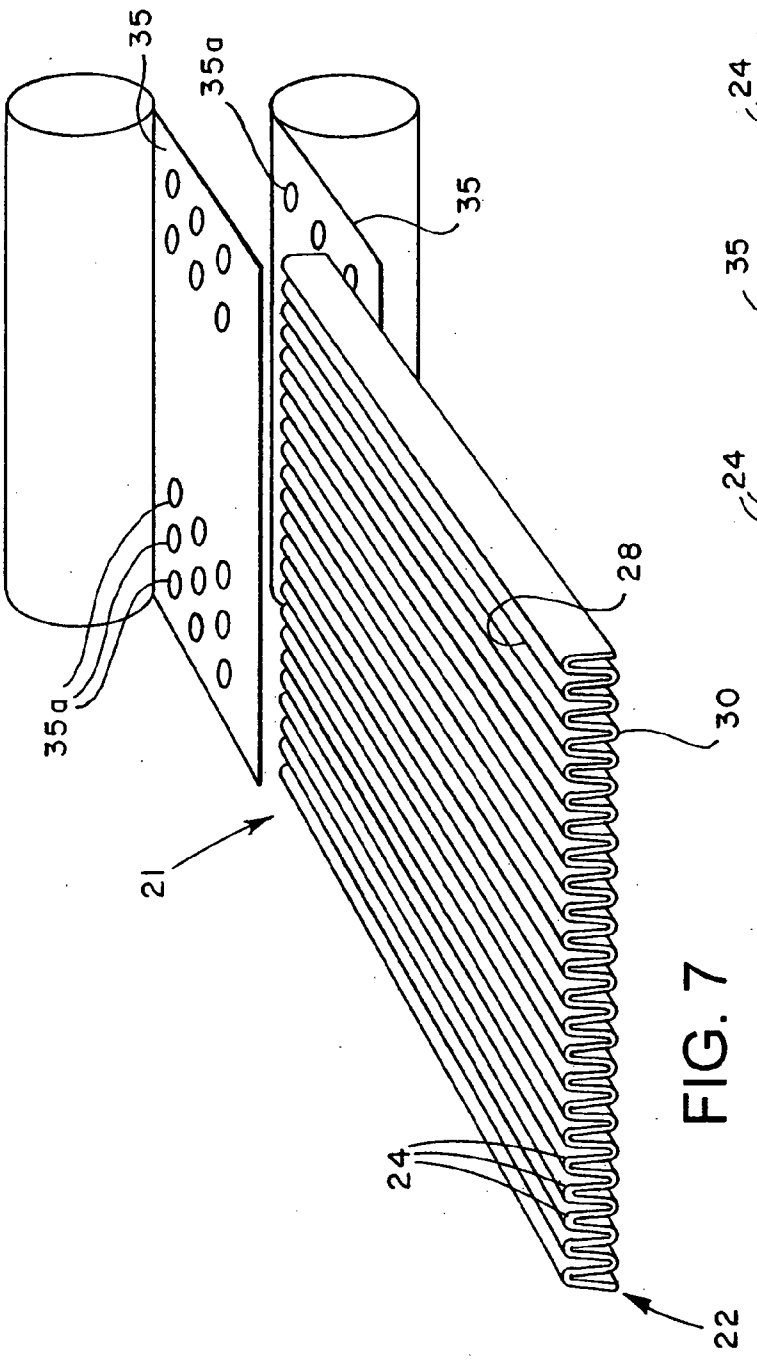

FIG. 7

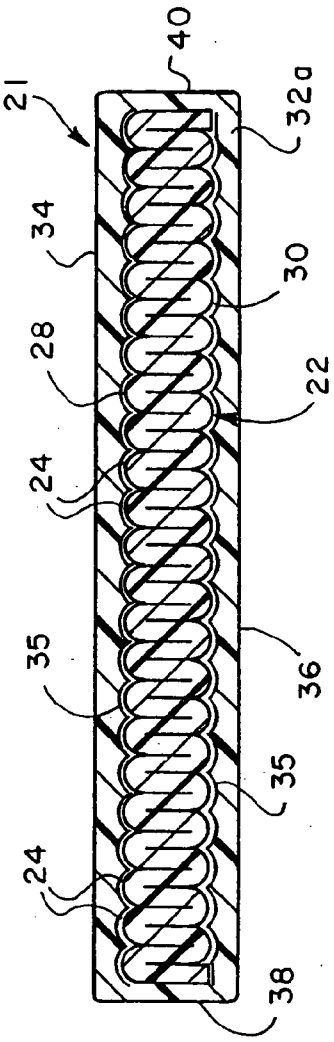

FIG. 7A

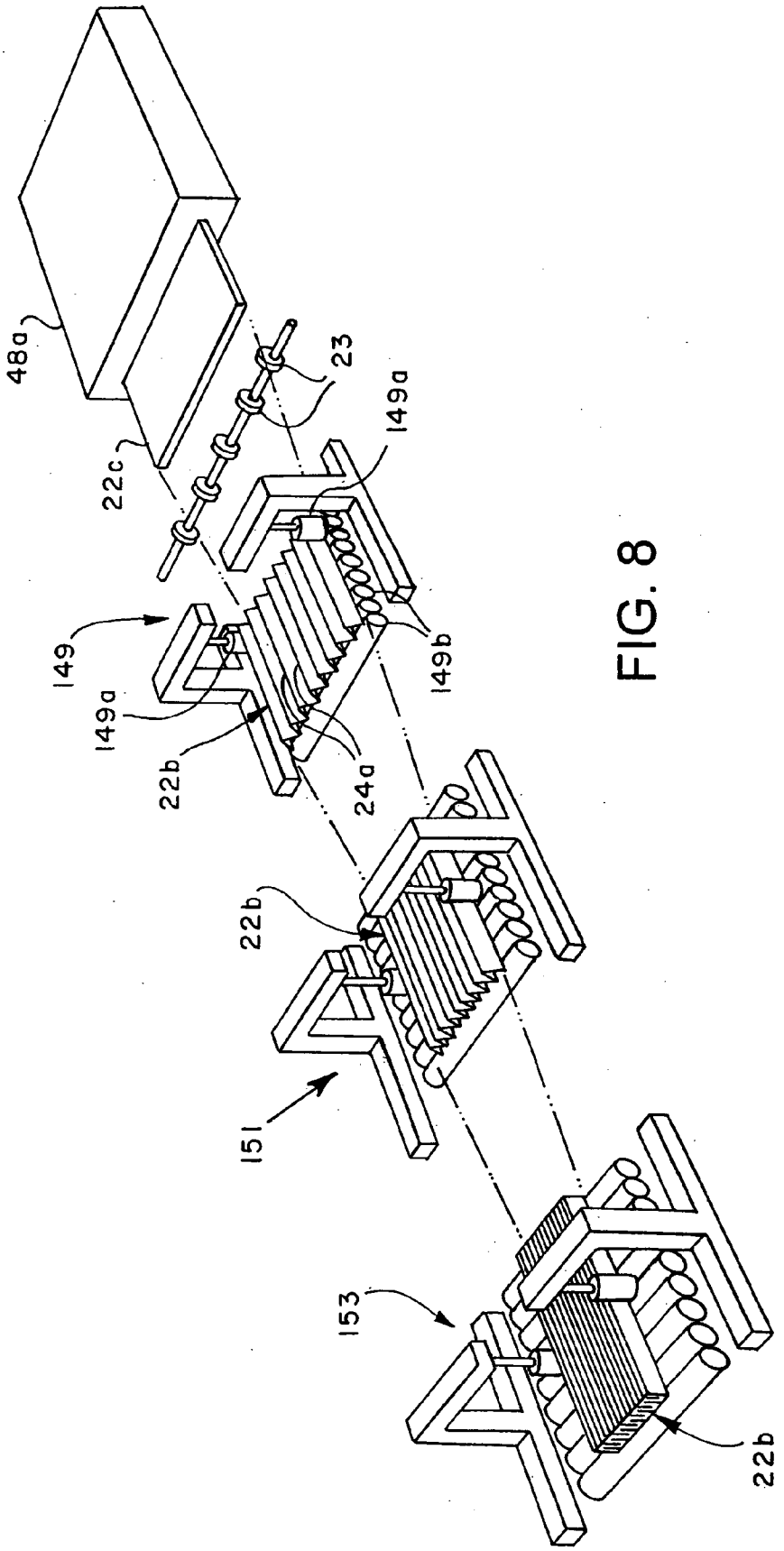

FIG. 8

EXTRUDED PLASTIC LUMBER AND METHOD OF MANUFACTURE

BACKGROUND OF THE INVENTION

[0001] Structural composite lumber or so-called plastic wood products have been developed in recent years wherein the composite structures are characterized by reinforced polymer compositions. So-called plastic lumber, for example, has been developed wherein wood fibers or wood flour is mixed with polymer materials, such as polypropylene or polyethylene, to form a composition which can be extruded into structural shapes, including conventional sizes and shapes of lumber. The advantages of such types of plastic lumber include high strength, rot resistance and ease of fabrication.

[0002] However, one disadvantage of prior art composite shapes comprising so-called plastic wood or plastic lumber, is competitive costs resulting from the cost of raw material but primarily resulting from the speed with which the so-called plastic wood shapes can be fabricated as compared with conventional lumber. Wood flour or wood particle/polymer compositions must be heated to substantial temperatures to perform extrusion processes required to form the structural shapes of plastic lumber. The speed of plastic lumber manufacturing processes has not, in many instances, been sufficient to make plastic lumber competitive with conventional lumber due to the relatively slow extrusion speeds required to allow the temperature of plastic or similar composite articles to be reduced to a level which will permit final fabrication and storage in an economical manner.

[0003] For example, the cross-sectional thickness of most types of conventional plastic lumber shapes is such that heat transfer from the core portion of the article being manufactured is not sufficient to allow finish processing of the article at a speed which is cost competitive with conventional lumber. Polymer materials used in fabricating conventional plastic lumber or plastic wood shapes have a relatively low heat transfer rate and the core temperature of conventional plastic lumber shapes remains too high to permit processing of the material at a competitive rate. However, in accordance with the present invention an improved composite or plastic lumber article is provided which is fabricated by an improved process, also in accordance with the invention.

BRIEF SUMMARY OF THE INVENTION

[0004] The present invention provides a composite or so-called plastic wood or plastic lumber article which may be fabricated in selected conventional cross-sectional shapes and dimensions. The present invention also provides an improved method for fabricating extruded composite structural articles, such as so-called plastic lumber.

[0005] In accordance with one aspect of the present invention, a composite, extruded lumber or extruded plastic wood article is provided which may be of a conventional cross-sectional shape, that is a rectangular cross-sectional shape of standard lumber dimensions, and which is characterized by a corrugated composite core part encapsulated in an outer layer of composite material to form a conventional cross-sectional shape of standard lumber dimensions, for example. The plastic lumber article may be fabricated using an extrudable polymer material which is reinforced by a wood particle or wood flour filler. The extruded plastic lumber articles may also be fabricated using other types of filler or reinforcement materials, such as glass fibers or other reinforcing fibers. Metal foil or sheet may also be encapsulated in or comprise part of the extruded plastic lumber article.

[0006] In accordance with another aspect of the invention, conventional lumber shaped articles are provided which include a corrugated core portion of composite material encapsulated within an outer layer of composite material and which are fabricated in a way which increases the speed of production of the articles. By way of example, a composite plastic board of a type used as a conventional fence picket may be fabricated by extruding a corrugated core part, cooling the core part and compressing the corrugations toward each other and then encapsulating the core part within an outer layer of material to form a so-called plastic lumber article having conventional cross-sectional dimensions of board width and thickness. Moreover, the composite lumber article may be cut to any specified length in a conventional manner and may be otherwise worked in the same manner as a conventional wood structural article.

[0007] The present invention further contemplates a method of fabricating composite or reinforced polymer structural articles, such as conventional lumber shapes, by extruding a reinforced plastic core part from a first extrusion die, cooling the core part and then encapsulating the core part by extruding an overlay of the same or similar composite material to form the final dimensions of the article. The time required to fully fabricate the article and to cool the article to a temperature where it may be worked further or placed in storage without any deleterious effects is minimized as compared with prior art methods.

[0008] In a preferred embodiment, a core part of the article is extruded from a first extrusion die as a corrugated, or zigzag cross-sectional shape, or is subsequently formed into such a shape to provide for rapid cooling of the extrudate, initially. The corrugated shape is compressed and guided by respective sets of guides to bring the folds or corrugations substantially contiguous with each other, after initial extrusion and cooling, and so as to maintain the desired flatness and size of the core shape prior to further working. The continuous extruded and compressed core part is then subjected to further cooling via a liquid spray, followed by submersion of the core part in cooling liquid, normally water, as it is being pulled from the extruder. The core part is guided through the cooling liquid spray by spaced apart sets of guide rollers to maintain flatness and sizing of the core part.

[0009] The continuous composite core part of the article is then passed through a dryer comprising a vacuum chamber and pressure air blowers to remove moisture from the core part. In a preferred arrangement of the processing apparatus, the core part is then passed through a conveyor type puller apparatus characterized by opposed endless belts which grip and traverse the core part along a fabrication path.

[0010] In accordance with a further aspect of the present invention, the composite extruded core part of the structural article is then passed through a second die wherein a coating of a second composition, preferably the same as the core part, is applied over the core part to completely encapsulate the core part. The article may then be passed through a set of rollers for final sizing of the article cross-sectional shape to provide sharp edges and flat surfaces, for example. The

continuous article, after sizing, enters an elongated cooling trough filled with cooling liquid, preferably water, followed by exit from the cooling trough and passage through an air blast curtain to remove water from the surface of the cooled and finished article. Prior to cooling, the article may be passed through one or more sets of embossing rollers to emboss the outer surfaces of the article to provide a woodgrain appearance, for example. Still further, a continuous belt-type pulling apparatus may be disposed downstream, in the direction of movement of the continuous extrudate, from the cooling water trough. The continuous finished composite lumber article may then be cut to length by a conventional sawing apparatus.

[0011] The composition of the article of the present invention may be somewhat varied. Conventional polymers used for extruded shapes may be used in forming the article and such polymers may be reinforced by various reinforcement materials including wood fibers, wood flour and fibers of other compositions including glass, carbon and the like.

[0012] Those skilled in the art will further appreciate the above-mentioned advantages and superior features of the invention together with other important aspects thereof upon reading the detailed description which follows in conjunction with the drawing.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0013] **FIG. 1** is a perspective view showing a portion of a core part of an extruded composite or plastic lumber article in accordance with the invention;

[0014] **FIG. 2** is a cross-section of a finished composite or plastic wood or lumber article in accordance with the invention;

[0015] **FIG. 3** is a general schematic diagram of a system for forming the extruded composite or plastic lumber article in accordance with the invention;

[0016] **FIG. 4** is a detail perspective view of a set of guide rollers for compressing and guiding the corrugated core part of the article of the present invention;

[0017] **FIG. 5** is a detail plan view in somewhat schematic form of the first stage liquid cooling apparatus for the system shown in **FIG. 3**;

[0018] **FIG. 6** is a detail perspective view of the second stage extrusion die for the system shown in **FIG. 3**;

[0019] **FIG. 7** is a detail perspective view showing a portion of the process of fabricating an alternate embodiment of an article according to the present invention;

[0020] **FIG. 7A** is a cross section view of the finished article shown in fabrication in **FIG. 7**; and

[0021] **FIG. 8** is a perspective view, in somewhat schematic form, illustrating a further alternate embodiment of an article, system and method in accordance with the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0022] In the description which follows, like parts are marked throughout the specification and drawing with the same reference numerals, respectively. The drawing figures are not necessarily to scale and certain features may be shown in somewhat schematic form in the interest of clarity and conciseness.

[0023] Referring to **FIGS. 1 and 2**, there is illustrated a composite plastic wood or lumber article in accordance with the invention and generally designated by the numeral **20**, **FIG. 2**. The article **20** is, by way of example, characterized as a generally rectangular cross-section plank or board which may have suitable dimensions for a finished standard lumber article for use as fence pickets. Those skilled in the art will recognize that various cross-sectional dimensions of width and thickness may be provided in fabricating various types of composite or plastic lumber articles, and the like, in accordance with the invention.

[0024] As shown in **FIGS. 1 and 2**, the plastic lumber article **20** includes a core part **22** formed of continuous folds or corrugations **24**. The corrugations **24** are shown in **FIG. 1** spaced apart and adjacent each other to leave opposed relatively shallow elongated parallel valley portions or recesses **26** on opposite sides **28** and **30** of the core part. **FIG. 2** further shows the plastic lumber article **20** with an outer coating **32**, which completely encapsulates the core part **22** and provides finished, opposed, parallel spaced apart, outer surfaces **34** and **36** and opposed, finished, parallel and spaced-apart outer surfaces **38** and **40** forming a conventional rectangular cross-section lumber article in accordance with the invention. The cross-section thickness of the corrugations of the core part **22** may vary from about 0.060" to about 0.200". For a lumber article having a width of about 3.20 inches and a thickness of about 0.40 inches delimited by surfaces **38** and **40** and surfaces **34** and **36**, respectively, the thickness of the corrugations **24** is preferably about 0.085".

[0025] The plastic or composite lumber article **20** may be formed of different compositions. For example, a preferred composition is a mixture of about 75% polypropylene and 25% wood flour, by weight. However, the reinforcing material may be other than wood flour including wood fibers, glass fibers, carbon fibers or other reinforcing fibers or particles, for example. The polymer material may also comprise polyethylene or another selected polymer. However, for purposes of general applications of conventional lumber articles, the above-mentioned wood flour/polypropylene composition is one which is preferred.

[0026] Referring now to **FIG. 3, a** system for fabricating the composite or plastic lumber article **20** is illustrated and generally designate by the numeral **42**. The system **42** includes a first extruder **44** of a type commercially available, such as a single or twin screw extruder by Davis Standard of Pawcatuck, Conn. Extruder **44** is adapted to receive material prepared for forming the core part **22** of article **20** by way of a suitable feeder hopper **46**. The raw material used for fabricating the article **20** may comprise, for example, preformed pellets of 25% wood flour and 75% polypropylene polymer by weight. Extruder **44** is adapted to extrude the heated polymer/wood flour composition to an extruder discharge temperature of about 380° F., for example. The core portion or part **22** is formed by an extrusion die **48**, which is mounted on the extruder **44** at a suitable discharge opening for the heated composition described above. The die **48** includes a die orifice having a cross-sectional shape corresponding to the shape of the corrugated core part **22**

wherein the corrugations **24** are spread further apart than in the finished article shown in **FIG. 2**.

[**0027**] As the heated plastic material is extruded from the die **48** to form core part **22**, it traverses a short distance unsupported and then is preferably guided by apparatus **49**, including opposed sets of guide rollers **49***a* and a set of support rollers **49***b*, see **FIG. 4** also, to compress the corrugations or folds **24** closer together so that the grooves or valleys **26** are substantially eliminated to approximate the finished core part **22**, as shown in **FIG. 2**. In other words, the corrugations **24** are moved together or contiguous with each other as shown in **FIG. 2**.

[**0028**] As the heated core material is extruded through the die **48** into ambient atmospheric conditions at normal room temperature, some cooling effect takes place before any guide rollers described above compress the corrugations **24** closer together, thanks to the decreased thickness and increased surface area of the core part **22** provided by the corrugations **24**. However, the continuous extruded core part **22** then enters a generally rectangular box-like, elongated cooling tank **52**, **FIGS. 3 and 5**, in which spaced-apart sets of water spray nozzles **53** are arranged to eject a water spray on at least top and bottom sides of the core part. Spaced apart sets of opposed guide rollers **54***a* and **54***b* are suitably mounted within the tank **52** for supporting the continuous core part **22** as it is extruded from the extruder **44** and to guide and support the core part to maintain its final cross-section dimension. For example, the core part **22** may not be substantially reduced in thickness after it is extruded from the extruder **44** but is reduced in width by compressing the corrugations **24** closer together at the apparatus **49** wherein the width is reduced to approximately 55% of the width of the core part exiting the extruder die **48**.

[**0029**] As the continuous extruded core part **22** is passed through the tank **52**, the temperature of the core part is reduced to about 200° F. A second liquid coolant tank **55**, **FIG. 3**, is mounted adjacent the discharge end of tank **52** and is adapted to guide the continuous core part **22** therethrough while submerged in a water bath **55***a*. Spaced-apart sets of top and bottom and side-to-side guide rollers, not shown, may be provided in the tank **55** to provide further guidance and support for the continuous extrusion of the core part **22** as it passes through the tank **55**.

[**0030**] Referring further to **FIG. 3**, the system **42** provides for removing moisture from the core part **22** as it exits tank **55**, including an apparatus **56**, which includes a generally rectangular hollow plate or box **56***a*, including an elongated vacuum chamber or slot **57** formed therein. Apparatus **56** is suitably connected to a source of vacuum **56***b* so that, as the core part **22** passes through the box **56***a*, moisture on the core part is evaporated and withdrawn therefrom. A suitable array of opposed air blast nozzles **56***c* may also be provided, see **FIG. 3**, and connected to a source of pressure air, not shown, for assisting in the removal of water from the surfaces of the core part **22** before it passes into the vacuum chamber or slot **57** of apparatus **56**.

[**0031**] The somewhat firm and cooled core part **22** is then passed through a device **60**, **FIG. 3**, including opposed motor driven endless conveyor belts **62** between which the core part **22** is disposed and engaged by for traversing the core part in timed relationship to the rate at which the extruder **44** is extruding the core part therefrom, so that the continuous core part **22** will not buckle or be stretched out of its preferred shape.

[**0032**] Referring still further to **FIG. 3**, the system **42** includes a second extruder apparatus **66** including an extruder die **68**, see **FIG. 6** also, into which the core part **22** is extended. The extruder **66** also includes a coating material receiving hopper **69** for receiving raw coating material in pellet form, for example, preferably having the same composition as the material used to form the core part **22**. Flowable coating material is injected into die **68** via conduit means **68***b*, **FIG. 6**, to completely envelope core part **22** with material which becomes coating **32**, **FIG. 2**. As the core part **22** passes through the extruder die **68**, the coating **32** is applied thereover to completely encapsulate the core part and to form the opposed surfaces **34**, **36**, **38** and **40**. For the dimensions of the article **20**, the coating is confined to a thickness of approximately 0.10".

[**0033**] Extruded article **20**, now having the opposed finished surfaces **34**, **36**, **38** and **40** formed thereon, may then be passed through an apparatus **70**, **FIG. 3**, including opposed rollers **72** and **74** which have suitable die surfaces thereon to provide embossing on surfaces **34** and **36**, for example, to simulate woodgrain, if desired. Other decorative or textured surfaces may be provided by modified rollers similar to the rollers **72** and **74**. The rollers **72** and **74** are preferably water cooled to provide some further cooling of the article **20** as it exits the extruder die **68**.

[**0034**] After passing through the apparatus **70**, the extruded article **20** is also passed through an apparatus **49***d*, similar to apparatus **49** and including a set of opposed rollers **49***a* and a second set of opposed rollers **49***b* for final sizing of the article to provide substantially flat and parallel surfaces **34** and **36** and **38** and **40**, respectively. Apparatus **49***d* is substantially like apparatus **49**, **FIG. 4**, but may include opposed sets of rollers **49***b* above and below article **20**. Alternatively, apparatus **49***d* may include only opposed sizing rollers **49***a*. The positions of rollers **49***a* and **49***b* are adjusted to accommodate the preferred dimensions of article **20**.

[**0035**] After passing through the sizing roller sets for apparatus **49***d* as just described, the continuous extruded article **20** is passed through a further cooling apparatus **78**, **FIG. 3**, comprising an elongated water filled tank for final cooling of the article. Article **20** is preferably submerged in a cooling water bath **78***a* in tank **78**. Upon exiting the tank **78**, continuous article **20** is subjected to an air blast from an array of air jet nozzles **82** or the like, **FIG. 3**, to remove further moisture from the surfaces of the article. Continuous feeding of the article **20** through the system **42** is aided by a second traversing apparatus **60***a* having opposed motor driven endless belts **62** which are spaced apart sufficiently to engage surfaces **34** and **36**, respectively, to feed the continuous article **20** at the same speed as the core part **22** is being fed by the apparatus **60**. Lastly, a controllable power saw **90** may be disposed downstream of the apparatus **60***a* for sawing the article **20** into predetermined lengths as the article **20** is ejected from the feed or traversing apparatus **60***a*.

[**0036**] Thanks to the construction of the composite plastic wood or lumber, article **20**, as illustrated and described, the core part **22** of the article and coating **32** are cooled faster

than if the entire cross-section of the finished article were formed in one extrusion operation. In this way, production speeds for extruding and finishing the article **20** may be increased. For an article **20** having the dimensions and composition described herein, the speed at which the article **20** is traversed through the system **42** shown and described may be in a range of about fifteen feet per minute to one hundred fifty feet per minute. Accordingly, by forming the core part **22** in the manner shown and described and, cooling same to a substantially reduced temperature, then extruding an overlay of reinforced polymer to encapsulate the core part and then cooling the finished article, an improved high strength composite plastic wood or lumber article may be fabricated efficiently and with a speed of manufacture sufficient to be cost competitive with conventional milled wood products. However, the composite plastic lumber article **20** enjoys all of the advantages of polymer based, or so-called plastic products.

[**0037**] Referring to **FIGS. 7 and 7**A, a second embodiment of a composite plastic article in accordance with the invention is illustrated and generally designated by the numeral **21**. The article **21** includes a core part **22**, formed in the same manner as the core part for the article **20**, and adapted to be encapsulated within an outer layer **32***a*, **FIG. 7**A, of composite material of the same composition. However, the composite or so-called plastic lumber article **21** also includes one or opposed layers **35** of metal foil, preferably aluminum, adapted for overlying the opposite sides **28** and **30** of the core part **22**, contiguous therewith and encapsulated by the aforementioned coating or outer layer **32***a*. The aluminum foil overlays or layers **35** are preferably perforated at perforations **35***a*, **FIG. 7**, over their entire surface to provide for the article outer layer or coating **32***a* to be contiguous with the surfaces of the core part **22** to form a suitable chemical and mechanical bond thereto. Accordingly, the composite or plastic lumber article **21** in accordance with the invention enjoys the benefits of the article **20** but is of enhanced strength due to the metal foil or sheet overlays **35** encapsulated between the coating or outer layer **32***a* and the core part **22**. The overlays **35** may also be formed in such a way as to enhance the appearance of the article **21** as well as its strength, particularly if the outer layer or coating **32***a* is relatively clear and free of reinforcement materials dispersed throughout.

[**0038**] Referring now to **FIG. 8**, another embodiment of the invention is illustrated wherein a plastic lumber article core part **22***b* is formed by extruding a thin rectangular sheet **22***c* of the same material as that which forms the core part **22**. Sheet **22***c* is extruded from a modified extruder die **48***a* adapted to be associated with the extruder **44** in place of the die **48**. Extruder die **48***a* thus forms a thin rectangular cross section sheet **22***c* which is then forced to form corrugations **24***a*. Corrugations **24***a* may be formed initially by traversing the sheet **22***c* over one or more sets of knife edge rollers **23**, one set shown in **FIG. 8**, so as to crease the sheet **22***c* to begin forming the corrugations **24***a*. The corrugations **24***a* are further developed by passing the sheet **22***c* through an apparatus **149** having opposed guide rollers **149***a* engageable with opposite sides of the sheet **22***c*. Suitable support rollers **149***b* are provided to guide and support the core part **22***b*. Second and third stage corrugation forming apparatus **151** and **153** may be provided, as shown in **FIG. 8**, to further develop and compress the corrugations **24***a* until the core part **22***b* is formed substantially like the core part **22**, as shown in **FIG. 2**. Once the core part **22***b* is formed with its corrugations **24***a* fully compressed to be contiguous with each other, the core part has been substantially cooled from its temperature at the exit of extruder die **48***a*. Core part **22***b* may be subjected to further processing to form an article **20** in the same manner as described above for the embodiment wherein the core part **22** is initially formed with corrugations **24** by the extruder die **48**.

[**0039**] One advantage of forming the core part **22***b* in the manner described above is that further cooling of the core part may take place before it is finally compressed, since the relatively thin sheet **22***c* will have its entire surface area exposed to cooling air circulation or other cooling fluids before the corrugations **24***a* are fully formed and compressed.

[**0040**] Preferred embodiments of an extruded, composite or plastic lumber article, a system for fabricating same and a method of fabricating same in accordance with the invention are believed to have been described in sufficient detail herein to enable one skilled in the art to practice the invention. Although an extruded composite or plastic wood or lumber article in accordance with the invention, as well as a system and method for the fabrication or formation thereof have been provided as described herein, those skilled in the art will recognize that various substitutions and modifications may be made to the articles **20** and **21**, the system **42** and modifications thereto and the method described above without departing from the scope and spirit of the invention as set forth in the appended claims.

What is claimed is:

1. An extruded plastic lumber article comprising:

a core part formed of a polymer material and having a cross-section which is compressed after extrusion through an extrusion die; and

a polymer coating disposed over the surfaces of said core part to encapsulate said core part to form said article.

2. The article set forth in claim 1 wherein:

said core part is formed to have a cross-section comprising repeated corrugations between one side of said core part and an opposite side of said core part.

3. The article set forth in claim 1 wherein:

opposed surfaces of said coating are embossed.

4. The article set forth in claim 1 wherein:

the composition of said core part and said coating comprises one of polypropylene and polyethylene.

5. The article set forth in claim 1 wherein:

the composition of one of said core part and said coating comprises one of reinforced polyethylene and polypropylene.

6. The article set forth in claim 5 wherein:

said one of said polypropylene and polyethylene is reinforced by wood particles.

7. The article set forth in claim 6 wherein:

the composition of said core part and said coating comprises about 25% wood flour and 75% polypropylene, by weight.

8. A plastic lumber article comprising:

a core part having a cross section comprising repeated corrugations extending between one side of said core part and an opposite side of said core part, said core part being formed of a reinforced polymer; and

a coating disposed over the surfaces of said core part to encapsulate said core part, said coating being formed of one of a polymer and a reinforced polymer.

9. The article set forth in claim 8 wherein:

said corrugations are compressed to be substantially contiguous with each other.

10. The article set forth in claim 8 wherein:

said core part is reinforced by wood particles dispersed throughout said core part.

11. The article set forth in claim 8 wherein:

said article is reinforced by at least one sheet of metal foil disposed between said core part and said coating.

12. The article set forth in claim 8 wherein:

said coating is reinforced by wood particles.

13. The article set forth in claim 8 wherein:

the composition of said core part and said coating comprises one of wood particles dispersed in polypropylene or polyethylene.

14. The article set forth in claim 8 formed by a process which includes:

extruding said core part;

cooling said core part after extrusion thereof; and

extruding said coating over said core part.

15. The article set forth in claim 8 formed by a process which includes:

compressing said corrugations to be substantially contiguous with each other before encapsulating said core part in said coating.

16. The article set forth in claim 15 formed by a process which includes:

cooling said core part after compressing said corrugations.

17. The article set forth in claim 16 formed by a process which includes:

passing said core part though a water spray to cool said core part.

18. The article set forth in claim 16 formed by a process which includes:

supporting at least opposite sides and a third side of said core part by support rollers while cooling said core part.

19. The article set forth in claim 8 formed by a process which includes:

providing an embossing on at least one surface of said article after disposing said coating over said core part.

20. The article set forth in claim 8 formed by a process which includes:

cooling said article after disposing said coating on said core part by passing said article in a continuous extrudate thereof through a quantity of cooling liquid.

21. The article set forth in claim 20 formed by the process which includes:

blowing pressure air over said article after removal of said article from said cooling liquid to remove liquid from the surfaces thereof.

22. The article set forth in claim 8 formed by a process which includes:

passing said core part through a vacuum chamber before disposing said coating over said core part.

23. The article set forth in claim 8 formed by a process which includes:

pulling said article through an extruder to apply said coating.

24. The article set forth in claim 8 formed by a process which includes:

pulling said article through a set of embossing rollers and a cooling liquid tank with a pulling apparatus engaged with said article at a point downstream of said tank in the direction of movement of said article.

25. A method for forming an extruded plastic lumber article comprising a core part formed of a reinforced polymer material encapsulated by a coating of a polymer material disposed over the surfaces of said core part, said method comprising the steps of:

forming said core part to have a cross section comprising repeated corrugations extending between one side of said core part and an opposite side of said core part;

cooling said core part after formation thereof;

extruding said coating over said core part to form said article;

cooling said article to reduce the temperature thereof; and

cutting said article into discrete lengths.

26. The method set forth in claim 25 including the steps of:

compressing said corrugations toward each other after forming said corrugations.

27. The method set forth in claim 26 including the steps of:

cooling said core part with a cooling liquid after compressing said corrugations.

28. The method set forth in claim 27 including the steps of:

supporting said core part by support roller means while cooling said core part.

29. The method set forth in claim 27 including the step of:

applying a vacuum to said core part after cooling said core part to remove moisture therefrom.

30. The method set forth in claim 27 including the step of:

blowing pressure air over said core part to remove cooling liquid from the surfaces thereof.

31. The method set forth in claim 25 including the step of:

embossing at least one surface of said article after extruding said coating over said core part.

32. The method set forth in claim 25 including the step of:

cooling said article after extruding said coating by passing said article in a continuous extrudate thereof through a quantity of cooling liquid.

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