

Description

This invention relates to a method of forming sandwich structures, comprising one of more non-corrugated sheet elements (liners) to which are bonded two or more corrugated (fluted) sheet elements (mediums) which are themselves bonded together.

Australian Patent Application 62323/86 discloses an improved corrugated paper board structure in which two or more layers of corrugated medium (flutes) are bonded together at the peaks of the flutes, and are sandwiched between two outer liners. The disclosures of Application 62323/86 are incorporated herein by reference.

Patent Specification 62323/86 also discloses a method of forming the structural paper in which two or more separate layers of corrugating medium are corrugated and then brought into flute tip to flute tip contact on synchronised corrugating rollers.

EP-A-213957 which is a prior document in accordance with Art.54(3)EPC discloses apparatus for forming a corrugated board having two corrugated mediums bonded flute tip to flute tip, this structure being faced on both sides with a liner.

FR-A-393156 on which, the preamble of claim 1 designated for the Contracting States AT, BE, CH, ES, GR, LI, LU and NL is based discloses a single faced corrugated board making apparatus capable of forming corrugated boards having two fluted mediums bonded together at the flute tips comprising mill roll stands for two mediums and one liner, two pairs of corrugating rolls synchronised so that the two fluted mediums are oriented for precise flute tip to flute tip bonding, a first adhesive application station adapted to apply adhesive to one of said fluted mediums prior to the flute tips of the said fluted mediums coming into contact, a second adhesive applicator station to apply adhesive to the exposed flute tips on one side of the bonded mediums or to the liner, a liner applicator roll located downstream of said second adhesive applicator and adapted to apply the liner to said one side of the bonded fluted mediums.

According to the present invention there is provided a carrier roll juxtaposed to one of the corrugating rolls and adapted to support and continuously constrain the bonded fluted mediums during the development of the adhesive bond and the liner applicator roll is juxtaposed to said carrier roll.

With conventional single faced board a degree of pressure is applied to ensure secure bonding between the liner and the corrugated medium. This application of pressure creates pressure lines on the outer face of the liner corresponding to the position of the flute tips. The need to apply pressure can adversely affect the strength of the single faced structure and adversely affects the appearance

of the board and its suitability for printing.

It is also an object of this invention to overcome these deficiencies in the conventional product.

Preferably, when the liner is brought into contact with the corrugated medium or mediums, the assembled liner and corrugated medium or mediums are subjected to heat, or other energy or chemical process to initiate or assist in completion of the bonding. This low pressure method of bonding gives superior bond strength (pin adhesion) than is achieved in conventional single-faced board.

With respect to EP-A-213957 which constitutes a prior art in accordance with Article 54(3)EPC, the scope of the present application is limited by a separate set of claims for Germany, France, United Kingdom, Italy and Sweden.

Known methods do not address the problem of capital cost in constructing a new corrugating plant for the flute to flute paper board and the likely under utilisation of existing corrugating machinery, making conventional flute to liner corrugating boards.

It is an object of this invention to provide a modification to existing corrugating machinery to enable conventional corrugated board, as well as the new flute to flute corrugated board, to be made. The modification can also be incorporated into the manufacture of new corrugating machinery to enable conventional corrugated board with improved printing properties and visual appearance to be also made.

Conventional machinery for forming corrugated board incorporates a unit for making single faced corrugated board, that is a liner adhered to a single fluted layer. More complex board constructions can be formed by bonding the exposed flutes to another liner and, if desired, subsequently bonding that to another single faced corrugated board.

A "single facer" plant normally includes as its essential components:

- a) Mill roll stands for liner and corrugating medium.
- b) A pair of corrugating rollers for corrugating the medium into a fluted medium.
- c) A pair of heated smooth (non corrugated) guide rolls for the liner board.
- d) A non corrugated pressure roll for bringing the liner into contact with the second corrugating roller to form the single faced board.
- e) An idler roll to guide the formed single faced board to subsequent processing units.

The present invention provides an improvement to a conventional single facer corrugated board making machine to enable the machine to make both conventional single faced board and flute to flute board which conventional single facer

corrugated making machine comprises mill roll stands for liner and corrugating medium, a pair of corrugating rolls for corrugating the medium into a fluted medium, a pair of heated smooth (non corrugated) guide rolls for the liner, an adhesive applicator for applying adhesive to the flute tips on one side of the fluted medium, a non corrugated pressure roll for bringing the liner into contact with the second corrugating roller to form the single facer board, and an idler roll to guide the formed single faced board to subsequent processing units, the improvement comprising providing a further pair of corrugating rolls synchronised with the existing pair of corrugating rolls, the existing adhesive applicator being used to effect the flute tip to flute tip bond, a mill roll stand for a second fluting medium to be fed through the further corrugating rolls, a second adhesive applicator for applying adhesive to either a liner or the exposed tips on one side of the flute tip to flute tip structure prior to bonding with a liner, and similar treatment of each medium prior to corrugating which similar treatment includes tension control, preheating, preconditioning, provision of heated S-wrap drive rolls, provision of steam box conditioners incorporating an additional carrier roll which operates as a take off roll and supports the flute tip to flute tip structure, holding it in a configuration which provides an accurately registered support during adhesive application and prohibits uncontrolled movement of the flute tip to flute tip structure during development of the adhesive bond with the liner a further guide roll being juxtaposed to said carrier roll to tangentially apply the liner to the bonded flute structure, wherein the arrangement is such that to produce single faced board, one fluting medium is omitted, one pair of corrugating rolls are not utilised and one of the adhesive applicators is not used.

Preferably the further corrugating rolls are provided in place of the heated rolls and pressure roll for the liner or are provided in addition thereto.

These modifications enable two fluting mediums to be precisely bonded flute tip to flute tip maintained in that orientation and then to be bonded to a liner as a first stage in preparing a flute to flute corrugating board. Where a conventional single faced board is to be formed one fluting medium is simply omitted and the one pair of corrugating rolls, the preferred pair being the upper pair are not utilised. Also the first adhesive applicator is preferably not used.

In forming the bonded fluted mediums it is necessary to constrain the mediums to maintain the flute orientation of each fluted layer and to maintain the orientation and symmetry of the flute tip to flute tip bonds. This may be achieved by using a grooved carrier roll to take up the bonded mediums and support them until the bond is set.

Alternatively a smooth carrier surface can be used in association with vacuum to provide the necessary constraint. Other means for constraining the mediums can also be used such as strings or straps to maintain the flute tips in correct orientation.

The improved strength characteristics of the double flute construction enable lighter weight board to be made having strengths equivalent to those found in heavier boards of conventional structure. Thus savings in material costs are possible using the flute to flute construction.

It has been found that boxes formed from flute to flute board exhibit superior durability and strength. The creasing and folding characteristics of board having flute to flute bonding are such that the corner and edge folds of boxes provide added strength to the construction. The flute to flute structure creases in a well defined manner to produce a hinged joint which is superior in strength, flexibility and visual appearance compared with creases in conventional board.

Bonded fluted mediums according to this invention can be subsequently bonded to any suitable liner material to form light weight structural laminates. The mediums can be manufactured from 100% cellulose fibre or ligno-cellulose fibre or combinations of cellulose, ligno-cellulose and synthetic fibres, or they may be laminated structures.

The liners or sheet elements may be of any material and structure of varying thickness including, but not limited to, paper board made of cellulose fibres, ligno-cellulose fibres; cellulose, ligno-cellulose and/or synthetic fibre mixtures; natural or synthetic polymers, wood, or metal; or laminates made of bonded layers of any combinations of these materials. Strips or strings of any material may also be fed intermittently, between the mediums across the flutes and thus be bonded at the flute tip to flute tip junction. The inclusion of such strips or strings will constrain the bonded mediums and prohibit expansion of the flute tip to flute tip structure until one or more liners are added and may additionally confer added strength to the board. Bonding may be achieved by use of adhesives or by other means such as, but not limited to, soldering, brazing and fusion welding.

Where a light weight structural panel for building such as ceiling panels or for use in furniture is required the liners can be wood veneer. In other applications such as air-frame skins for aircraft, the liners may be metal foil or synthetic polymers.

The modification of a single flute station according to this invention enables in a conventional corrugator, the elimination of the need for pressure application to secure the bond between the liner and the corrugated medium. The use of the heat or other means to complete the bonding process of

the first liner to corrugated medium or mediums at the single facer is an innovation and has the advantage of not adversely affecting the strength of the board and of not adversely affecting the appearance of the board by reducing the normal pressure lines.

A preferred embodiment of this invention will now be described with reference to the drawings in which figure 1 represents a schematic view of a conventional single facer unit; figure 2 shows a schematic view of the unit as modified by this invention for forming a flute to flute structure; figure 3 shows a detailed view of figure 2 and figure 4 shows the modified unit of this invention when used to make conventional single faced corrugated board.

A conventional single facer unit comprises mill roll stands 4 and 5, a preheater roll 6, a single facer station 7 and a mill roll 8 stand for fluting medium 23.

The single facer station 7 comprises the corrugating rolls 10 and 11, adhesive applicator 12, pressure roll 13 for pressing the liner against the corrugated medium 23 on roll 11. The liner board 21 is fed from stand 5 over preheater roll 6 to the heated smooth guide rolls 14 and 15.

The formed single faced board 24 is transferred to idler roll 16 and then to conveyor 17 which transports the single faced board 24 for further processing.

In the modified unit of this invention one of the mill roll stands 5 is used for a second corrugating medium 22 while an other mill roll stand is used for liner 21. A new guide roll 31 is used to guide the liner onto preheater roll 6 and then under a new guide roll 32, to the S wrap rolls and onto the carrier roll 36.

For medium 22, a second preheater roll 42 is inserted under preheater roll 6. A new roll guide 43 is used to guide the medium onto the preheater roll 42 and then under a new guide roll 44.

For medium 23, a further preheater roll 45 is used. This will require a roll guide 46 and a roll guide 47 to guide the medium into the single facer S wrap heated rolls. Steam sprays may be mounted on preheater rolls to precondition the sheet.

Steam boxes may be located before rolls 10 and 34 to condition the mediums prior to corrugating.

An automatic splicer may be utilized with each medium coming from roll stands 5 and 8 with the liner coming from roll stand 4.

The guide roll 14 and pressure roll 13 shown in figure 1 are replaced by corrugating rolls 34 and 35. The heated smooth guide roll 15 is used to preheat the corrugating medium 22. The two corrugated mediums 22 and 23 are adhered together between rolls 35 and 11 which are driven synchro-

nously to ensure precise flute tip to flute tip bonding. This can be achieved by installing a direct drive, meshed gear drive or toothed belt drive between the driven lower corrugating roll 35 and the corrugating roll 11.

A carrier roll 36 is installed to operate as a take-off roll and to provide support and constraint for the bonded mediums.

The carrier roll 36 may be constructed as a shell with appropriate drilling for vacuum application to hold the flute to flute structure in position on the carrier roll. Fingers or guides may also be provided to achieve the positioning of the flute to flute structure on the carrier roll and the corrugating rolls.

As an alternative, the corrugating rolls 11 and 35 can be arranged with a vacuum facility to hold the fluted product in the roll flutes. The area providing the vacuum on roll 35, can be extended to hold the flute to flute structure in the roll flutes and present them in such a way as to achieve a correctly aligned transfer to the carrier roll 36.

The carrier roll 36 may be a plain or grooved cylindrical surface or may also be provided with spaced bars of metallic or non-metallic materials to carry the flute to flute structure.

Holding of the flute to flute structure to the carrier roll 36 may also be achieved by use of vacuum, applied from within the carrier roll inner cavity.

A new adhesive applicator station 37 is located adjacent to the carrier roll 36 to apply adhesive to the flute tips on the exposed face of the flute to flute structure. The surface of the carrier roll may be arranged to provide a positive air pressure at point 40, causing the flute to flute structure to "puff out" ensuring a good transfer of the adhesive to the exposed tips of the structure. The roll 38 guides the liner 21 to join with the flute to flute structure to form one particular example of the structures which are the subject of the invention disclosed in Australian Patent Application No. 62323/86.

The top liner 21 is assisted in bonding to the flute to flute structure after the glue application by an input of energy in the form of radiant or convected heat, microwave or other energy by the units 39.

All components may be pre-heated, moistened or pre-treated to accelerate bonding of the component to component interfaces.

The carrier roll, assisted by positive air pressure from the blow box 40 inside the carrier roll 36, or vacuum from the liner side, will discharge the combined liner and flute to flute structure 25 to transport section 41 preceding the next processing station.

The transport section 41 may be straight or

curved in shape, and if curved, the curve will be arranged to utilise tension forces in the liner to apply gentle pressure to the glue bond. A change in radius will achieve further beneficial bond development.

The transport section 41 may be provided with a driven carrier belt or belts to transfer the combined liner and flute to flute structure to the next section or next processing unit.

The carrier roll 36 is driven by a separate synchronised drive, a meshed gear drive or a toothed belt drive from the lower corrugating roll 35 or primary driven roll 11 to ensure it is synchronised with the corrugating roll 35. Precision, of flute tip to flute tip bonding and in the control of transfer from corrugating roll 35 to the carrier roll 36 and in the positional restraint of the flute to flute structure prior to the addition of liner 21 form key elements of this invention.

As shown in figure 4 the modified unit of this invention can also be used to make an improved form of conventional single faced corrugated board.

An improved single-faced corrugated board may be produced by ceasing to feed the corrugating medium 23 to the corrugating rolls 10 and 11 and also ceasing to apply glue to glue station 12 while continuing application at glue station 37 to corrugated medium 22. In this case the glue station 37 is moved towards the carrier roll 36 to contact the thinner conventional corrugated sheet and the carrier roll 36 is rotated through one half flute pitch to bring corrugated medium 22 into mesh with carrier roll 36, after leaving corrugating roll 35.

From the above it can be seen that the production of board structures with flute tip to flute tip bonding can be achieved with modification of existing machinery or construction of new machinery.

Also from the above it can be seen that the production of conventional board structures with improved appearance can be achieved.

Claims

Claims for the following Contracting States : AT, BE, CH, ES, GR, LI, LU, NL

1. A single faced corrugated board making apparatus capable of forming corrugated boards having two fluted mediums bonded together at the flute tips comprising

- a) mill roll stands for two mediums (22,23) and one liner (21),
- b) two pairs of corrugating rolls (10,11,34,35) synchronised so that the two fluted mediums are oriented for precise flute tip to flute tip bonding,
- c) a first adhesive application station (12) adapted to apply adhesive to one of said fluted mediums prior to the flute tips of the

said fluted mediums coming into contact,
d) a second adhesive applicator station (33) to apply adhesive to the exposed flute tips on one side of the bonded mediums or to the liner

e) a liner applicator roll (38) located downstream of said second adhesive applicator and adapted to apply the liner (21) to said one side of the bonded fluted mediums, characterised in that:

f) a carrier roll (36) is juxtaposed to one of the corrugating rolls and adapted to support and continuously constrain the bonded fluted mediums during the development of the adhesive bond; and in that

g) the liner applicator roll (38) is juxtaposed to said carrier roll.

2. Apparatus as claimed in claim 1, characterised in that the liner applicator roll (38) is positioned to enable a tangential approach of the liner (21) prior to bonding to the bonded fluted mediums.

3. Apparatus as claimed in claim 1 characterised in that

a) the second adhesive applicator (37) is located adjacent the carrier roll (36) and applies adhesive to the exposed flute tips of the bonded fluted mediums, and in that

b) an energy applicator (39) is located adjacent to said carrier roll (36) downstream of the liner applicator roll to promote bonding of the liner (21) to the bonded fluted mediums.

Claims for the following Contracting States : DE, FR, GB, IT, SE

1. An improvement to a conventional single facer corrugated board making machine to enable the machine to make both conventional single faced board and flute to flute board which conventional single facer corrugated board making machine comprises mill roll stands (5,8) for liner (21) and corrugating medium (23), a pair of corrugating rolls (10,11) for corrugating the medium (23) into a fluted medium, a pair of heated smooth (non corrugated) guide rolls (14,15) for the liner, an adhesive applicator (12) for applying adhesive to the flute tips on one side of the fluted medium, a non corrugated pressure roll (13) for bringing the liner into contact with the second corrugating roller (11) to form the single facer board, and an idler roll (16) to guide the formed single faced (24) board to subsequent processing units, the improvement comprising providing a further

curved in shape, and if curved, the curve will be arranged to utilise tension forces in the liner to apply gentle pressure to the glue bond. A change in radius will achieve further beneficial bond development.

The transport section 41 may be provided with a driven carrier belt or belts to transfer the combined liner and flute to flute structure to the next section or next processing unit.

The carrier roll 36 is driven by a separate synchronised drive, a meshed gear drive or a toothed belt drive from the lower corrugating roll 35 or primary driven roll 11 to ensure it is synchronised with the corrugating roll 35. Precision, of flute tip to flute tip bonding and in the control of transfer from corrugating roll 35 to the carrier roll 36 and in the positional restraint of the flute to flute structure prior to the addition of liner 21 form key elements of this invention.

As shown in figure 4 the modified unit of this invention can also be used to make an improved form of conventional single faced corrugated board.

An improved single-faced corrugated board may be produced by ceasing to feed the corrugating medium 23 to the corrugating rolls 10 and 11 and also ceasing to apply glue to glue station 12 while continuing application at glue station 37 to corrugated medium 22. In this case the glue station 37 is moved towards the carrier roll 36 to contact the thinner conventional corrugated sheet and the carrier roll 36 is rotated through one half flute pitch to bring corrugated medium 22 into mesh with carrier roll 36, after leaving corrugating roll 35.

From the above it can be seen that the production of board structures with flute tip to flute tip bonding can be achieved with modification of existing machinery or construction of new machinery.

Also from the above it can be seen that the production of conventional board structures with improved appearance can be achieved.

Claims

**Claims for the following Contracting States :
AT, BE, CH, ES, GR, LI, LU, NL**

1. A single faced corrugated board making apparatus capable of forming corrugated boards having two fluted mediums bonded together at the flute tips comprising

- a) mill roll stands for two mediums (22,23) and one liner (21),
- b) two pairs of corrugating rolls (10,11,34,35) synchronised so that the two fluted mediums are oriented for precise flute tip to flute tip bonding,
- c) a first adhesive application station (12) adapted to apply adhesive to one of said fluted mediums prior to the flute tips of the

said fluted mediums coming into contact,
d) a second adhesive applicator station (33) to apply adhesive to the exposed flute tips on one side of the bonded mediums or to the liner

e) a liner applicator roll (38) located downstream of said second adhesive applicator and adapted to apply the liner (21) to said one side of the bonded fluted mediums, characterised in that:

f) a carrier roll (36) is juxtaposed to one of the corrugating rolls and adapted to support and continuously constrain the bonded fluted mediums during the development of the adhesive bond; and in that

g) the liner applicator roll (38) is juxtaposed to said carrier roll.

2. Apparatus as claimed in claim 1, characterised in that the liner applicator roll (38) is positioned to enable a tangential approach of the liner (21) prior to bonding to the bonded fluted mediums.

3. Apparatus as claimed in claim 1 characterised in that

a) the second adhesive applicator (37) is located adjacent the carrier roll (36) and applies adhesive to the exposed flute tips of the bonded fluted mediums, and in that

b) an energy applicator (39) is located adjacent to said carrier roll (36) downstream of the liner applicator roll to promote bonding of the liner (21) to the bonded fluted mediums.

**Claims for the following Contracting States :
DE, FR, GB, IT, SE**

1. An improvement to a conventional single facer corrugated board making machine to enable the machine to make both conventional single faced board and flute to flute board which conventional single facer corrugated board making machine comprises mill roll stands (5,8) for liner (21) and corrugating medium (23), a pair of corrugating rolls (10,11) for corrugating the medium (23) into a fluted medium, a pair of heated smooth (non corrugated) guide rolls (14,15) for the liner, an adhesive applicator (12) for applying adhesive to the flute tips on one side of the fluted medium, a non corrugated pressure roll (13) for bringing the liner into contact with the second corrugating roller (11) to form the single facer board, and an idler roll (16) to guide the formed single faced (24) board to subsequent processing units, the improvement comprising providing a further



pair of corrugating rolls (34,35) synchronised with the existing pair of corrugating rolls (10,11), the existing applicator (12) being used to effect the flute tip to flute tip bond, a mill roll stand for a second fluting medium (22) to be fed through the further corrugating rolls (34,35), a second adhesive applicator (37) for applying adhesive to either a liner or the exposed tips on one side of the flute tip to flute tip structure prior to bonding with a liner, and similar treatment of each medium prior to corrugating which similar treatment includes tension control, preheating, preconditioning, provision of heated S-wrap drive rolls, provision of steam box conditioners incorporating an additional carrier roll (36) which operates as a take off roll and supports the flute tip to flute tip structure, holding it in a configuration which provides an accurately registered support during adhesive application and prohibits uncontrolled movement of the flute tip to flute tip structure during development of the adhesive bond with the liner, a further guide roll (38) being juxtaposed to said carrier roll (36) to tangentially apply the liner to the bonded flute structure, wherein the arrangement is such that to produce single faced board, one fluting medium is omitted, one pair of corrugating rolls are not utilised and one of the adhesive applicators is not used.

2. An improvement as claimed in claim 1 wherein the further corrugating rolls (34,35) are provided in place of the heated guide rolls (14) and pressure roll (13) for the liner or are provided in addition thereto.

Patentansprüche

Patentansprüche für folgende Vertragsstaaten
: AT, BE, CH, ES, GR, LI, LU, NL

1. Vorrichtung zur Herstellung von einseitiger Wellpappe, die geeignet ist, Wellpappen zu bilden, bei denen zwei gewellte Materialien an den Wellenspitzen aneinander gebunden sind, mit

a) Prägewerkwalzgerüsten für zwei Materialien (22, 23) und einem Abdeckmaterial (21),

b) zwei Paar wellenbildenden Walzen (10, 11, 34, 35), die so synchronisiert sind, daß die beiden gewellten Materialien für ein genaues Verbinden von Wellenspitze zu Wellenspitze orientiert sind,

c) einer ersten Klebstoffauftragsstation (12), die so eingerichtet ist, daß sie Klebstoff auf eines der gewellten Materialien aufbringt, bevor die Wellenspitzen der genannten ge-

wellten Materialien miteinander in Kontakt kommen,

d) einer zweiten Klebstoffauftragsstation (33) zum Aufbringen von Klebstoff auf die freiliegenden Wellenspitzen an einer Seite der miteinander verbundenen Materialien oder auf das Abdeckmaterial und

e) einer Walze (38) zum Aufbringen des Abdeckmaterials, die stromabwärts von der zweiten Klebstoffauftragsstation angeordnet und so eingerichtet ist, daß sie das Abdeckmaterial (21) auf die genannte eine Seite der miteinander verbundenen gewellten Materialien aufbringt, dadurch gekennzeichnet, daß

f) neben einer der wellenbildenden Walzen eine Trägerwalze (36) angeordnet und dazu eingerichtet ist, die miteinander verbundenen gewellten Materialien während der Entwicklung der Klebstoffbindung zu stützen und kontinuierlich unter Zug zu setzen, und daß

g) die Walze (38) zum Aufbringen des Abdeckmaterials neben der genannten Trägerwalze angeordnet ist.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Walze (38) zum Aufbringen des Abdeckmaterials derart positioniert ist, daß sie eine tangential Annäherung des Abdeckmaterials (21) ermöglicht, bevor eine Bindung an die miteinander verbundenen gewellten Materialien erfolgt.

3. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß

a) die zweite Klebstoffauftragsvorrichtung (37) neben der Trägerwalze (36) angeordnet ist und Klebstoff auf die freiliegenden Wellenspitzen der miteinander verbundenen gewellten Materialien aufbringt, und daß

b) eine Energiezufuhreinrichtung (39) neben der genannten Trägerwalze (36) und stromabwärts von der Walze zum Aufbringen des Abdeckmaterials angeordnet ist, um die Bindung des Abdeckmaterials (21) an die miteinander verbundenen gewellten Materialien, unterstützen.

Patentansprüche für folgende Vertragsstaaten
: DE, FR, GB, IT, SE

1. Verbesserung einer üblichen Vorrichtung zur Herstellung von einseitiger Wellpappe, um es zu ermöglichen, daß die Vorrichtung sowohl übliche einseitige Wellpappe als auch Pappe des Typs Welle-an-Welle erzeugen kann, wobei die Vorrichtung Prägewerk-Walzgerüste (5,



8) für ein Abdeckmaterial (21) und für ein gewelltes Material (23), ein Paar wellenbildende Walzen (10, 11) zum Überführen eines Materials (23) in ein gewelltes Material, ein Paar erhitzter glatter (nicht gewellter) Führungswalzen (14, 15) für das Abdeckmaterial, eine Klebstoffauftragsvorrichtung (12) zum Aufbringen von Klebstoff auf die Wellenspitzen an einer Seite des gewellten Materials, eine nicht gewellte Druckwalze (13), um das Abdeckmaterial mit der zweiten gewellten Walze (11) in Kontakt zu bringen und die einseitige Wellpappe zu bilden, sowie eine Leitwalze (16) zur Führung der gebildeten einseitigen Wellpappe (24) zu nachfolgenden Verarbeitungseinheiten aufweist, wobei die Verbesserung darin besteht, daß ein weiteres Paar von wellenbildenden Walzen (34, 35) vorgesehen ist, die mit dem bereits vorhandenen Paar von wellenbildenden Walzen (10, 11) synchronisiert sind, und die bereits vorhandene Klebstoffauftragsvorrichtung (12) dazu benutzt wird, um die Bindung von Wellenspitze zu Wellenspitze zu bewirken, und ein Prägwerk-Walzgerüst für ein zweites gewelltes Material (22) vorliegt, das durch die weiteren wellenbildenden Walzen (34, 35) geführt werden soll, eine zweite Klebstoffauftragsvorrichtung (37) zum Aufbringen von Klebstoff auf entweder das Abdeckmaterial oder die freiliegenden Spitzen an einer Seite der Struktur des Type Welle-an-Welle vor dem Verbinden mit einem Abdeckmaterial vorgesehen ist, sowie eine ähnliche Behandlung jedes der Materialien vor der Wellenbildung stattfindet, wobei diese Behandlung die Einstellung der Spannung, das Vorerhitzen, das Vorkonditionieren, das Bereitstellen von erhitzten S-förmig umschlungenen Antriebswalzen und das Bereitstellen von Dampfkammer-Konditioniereinrichtungen umfaßt, die mit einer zusätzlichen Trägerwalze (36) ausgerüstet ist, welche als Abnahmewalze arbeitet und die Welle-an-Welle-Struktur abstützt und sie dabei in einer Konfiguration hält, die zu einem genauen Übereinstimmenden Tragen während des Aufbringens von Klebstoff führt und eine unkontrollierte Bewegung der Wellenspitze-zu-Wellenspitze-Struktur während der Entwicklung der Klebstoffbindung mit dem Abdeckmaterial verhindert, und eine weitere Führungswalze (38) neben der genannten Trägerwalze (36) angeordnet ist, um das Abdeckmaterial tangential auf die gebundene Wellenstruktur aufzubringen, wobei die Anordnung derart ist, daß zum Herstellen einer einseitigen Wellpappe ein wellenbildendes Material weggelassen, ein Paar der wellenbildenden Walzen nicht benutzt und eine der Klebstoffauftragsvorrichtungen nicht ver-

wendet wird.

2. Verbesserung nach Anspruch 1, worin die weiteren wellenbildenden Walzen (34, 35) anstelle der erhitzten Führungswalzen (14) und der Druckwalze (13) für das Abdeckmaterial oder zusätzlich hierzu vorgesehen sind.

Revendications

Revendications pour les Etats contractants suivants : AT, BE, CH, ES, GR, LI, LU, NL

1. Appareil pour fabriquer du carton ondulé simple face, capable de former des cartons ondulés comportant deux éléments nervurés assemblés l'un avec l'autre par adhérence au niveau des sommets des nervures, comprenant
 - a) des supports de rouleaux de matériaux pour deux éléments (22, 23) et une doublure (21),
 - b) deux paires de rouleaux à onduler (10, 11, 34, 35) synchronisés de façon que les deux éléments nervurés soient orientés pour permettre un assemblage par adhérence précis sommets de nervures contre sommets de nervures,
 - c) un premier poste d'application d'adhésif (12) conçu pour appliquer un adhésif à l'un desdits éléments nervurés avant que les sommets des nervures desdits éléments nervurés n'entrent en contact,
 - d) un second poste d'application d'adhésif (37) pour appliquer un adhésif aux sommets exposés des nervures, d'un côté des éléments assemblés par adhérence ou à la doublure,
 - e) un rouleau applicateur de doublure (38) situé en aval dudit second applicateur d'adhésif et conçu pour appliquer la doublure (21) audit côté des éléments nervurés assemblés par adhérence, caractérisé en ce que :
 - f) un rouleau porteur (36) est juxtaposé à l'un des rouleaux à onduler et conçu pour supporter et serrer continuellement les éléments nervurés assemblés par adhérence pendant le déroulement de la liaison adhésive ; et en ce que
 - g) le rouleau applicateur de doublure (38) est juxtaposé audit rouleau porteur.
2. Appareil selon la revendication 1, caractérisé en ce que le rouleau applicateur de doublure (38) est positionné pour permettre une approche tangentielle de la doublure (21) avant son assemblage par adhérence avec les éléments nervurés assemblés par adhérence.



3. Appareil selon la revendication 1, caractérisé en ce que

- a) le second applicateur d'adhésif (37) est situé à proximité du rouleau porteur (36) et applique un adhésif aux sommets exposés des nervures des éléments nervurés assemblés par adhérence, et en ce que
- b) un applicateur d'énergie (39) est situé à proximité dudit rouleau porteur (36), en aval du rouleau applicateur de doublure, pour favoriser l'assemblage par adhérence de la doublure (21) avec les éléments nervurés assemblés par adhérence.

Revendications pour les Etats contractants suivants : DE, FR, GB, IT, SE

1. Perfectionnement à une machine pour fabriquer du carton ondulé simple face classique, permettant à la machine de fabriquer aussi bien du carton simple face que du carton nervures contre nervures classiques, laquelle machine à fabriquer du carton ondulé simple face classique comprend des supports (5, 8) de rouleaux de matériaux pour une doublure (21) et un élément à onduler (23), une paire de rouleaux à onduler (10, 11) pour onduler l'élément (23) en un élément nervuré, une paire de rouleaux de guidage lisses (non ondulés) chauffés (14, 15) pour la doublure, un applicateur d'adhésif (12) pour appliquer un adhésif aux sommets des nervures, d'un côté de l'élément nervuré, un rouleau presseur non ondulé (13) pour amener la doublure en contact avec le second rouleau à onduler (11) afin de former le carton simple face, et un rouleau libre (16) pour guider le carton simple face formé vers des unités de traitement suivantes, le perfectionnement consistant à prévoir une autre paire de rouleaux à onduler (34, 35) synchronisés avec la paire existante de rouleaux à onduler (10, 11), l'applicateur existant (12) étant utilisé pour effectuer l'assemblage par adhérence sommets de nervures contre sommets de nervures, un support de rouleau de matériau pour un second élément à nervurer (22) destiné à être amené entre les autres rouleaux à onduler (34, 35), un second applicateur d'adhésif (37) pour appliquer un adhésif soit à une doublure soit aux sommets exposés, d'un côté de la structure sommets de nervures contre sommets de nervures, avant leur assemblage par adhérence avec une doublure, et un traitement similaire de chaque élément, avant ondulation, lequel traitement similaire comprend un contrôle de la tension, un préchauffage, un préconditionnement, la mise en place de rouleaux d'entraînement chauffés à

enroulement en S, la mise en place de conditionneurs à chambre à vapeur incorporant un rouleau porteur supplémentaire (36) qui fonctionne comme rouleau dévideur et supporte la structure sommets de nervures contre sommets de nervures, en la maintenant dans une configuration qui définit un support amené à coïncider avec précision pendant l'application de l'adhésif, et qui interdit un déplacement incontrôlé de la structure sommets de nervures contre sommets de nervures, pendant le déroulement de la liaison adhésive avec la doublure, un autre rouleau de guidage (38) étant juxtaposé audit rouleau porteur (36) pour appliquer tangentiellement la doublure à la structure de nervures assemblées par adhérence, dans lequel la disposition est telle que pour produire du carton simple face, un élément à nervurer est supprimé, une paire de rouleaux à onduler n'est pas utilisée et l'un des applicateurs d'adhésif n'est pas utilisé.

2. Perfectionnement selon la revendication 1, dans lequel les autres rouleaux à onduler (34, 35) sont prévus à la place des rouleaux de guidage chauffés (14) et du rouleau presseur (13) pour la doublure, ou sont prévus en plus de ceux-ci.

