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(54) Apparatus for the continuous production of wood-based laminates

(57) An apparatus for the continuous production of wood-based laminates (68), starting from a malleable agglomerate whose basic components are wood flour, thermoplastic adhesive, diluting agents, inert materials and fire-proof materials to make the laminate fireproof. The apparatus comprises, in succession, a starting set (1) for preparing the malleable agglomerate, followed by a laminating station (2) which forms a thin layer (23) of the agglomerate, determining its required thickness; an optional engraving station (4) to restore, on the layer

(23) the characteristic grain of the wood, preparing the layer (23) for it with a first partial and preliminary suitable dispersion of part of the volatile products (diluting agents) with a ventilation station (3) which precedes the engraving station (4); an optional rapid drying station (5); a cutting station (6), to form and define the size of the definitive laminate (68), which can be packaged in overlaid sheets or reels, since the laminate can be heat-moulded.

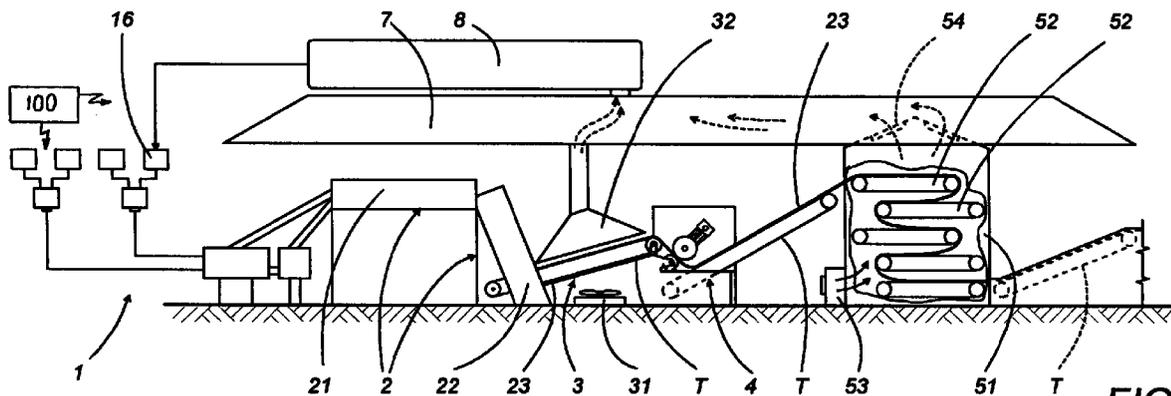


FIG. 1

Description

The present invention relates to an apparatus for the continuous production, starting from a malleable agglomerate, of wood-based laminates for veneering and wainscoting.

As is well known, wooden furniture is, in the vast majority of cases, wainscoted with thin wooden laminates, obtained by shearing directly off the wood used. These laminates are utilised to manufacture furniture and also as wainscoting materials. The work process for these laminates is quite complex and naturally, given the nature of wood, it entails a large quantity of scrap. The purpose of the invention is to eliminate the drawbacks stated above, providing a wood-base laminate, less expensive and with the elimination of scrap.

The present invention is an agglomerate constituted essentially by extremely fine wooden particles (wood flour), of an average diameter of about 75 micron and inert components closely linked to each other by aceto-vinyl resins.

The high wood content, as well as the particular production technique, allow to obtain a material that is truly alternative to natural wood.

The subject laminate can be produced in thicknesses ranging from 0.3 mm and 0.5 mm, depending on the envisioned use.

During the productive phase, the surface of the laminate undergoes an engraving or embossing process, in order to imitate more realistically the grain of the chosen wood; without such embossing, it can be lacquered directly.

The laminate has characteristics which are wholly similar to a normal wood in regard to gluing and painting, with the advantage of an enormously lower porosity.

It is easily heat-moulded starting at the temperature of 20/30°C, and this can be exploited advantageously to wainscot curved surfaces, frames, etcetera; with the aid of a hot air source, the laminate can be modeled and adapted for gluing on any kind of support.

Since the laminate can be heat-moulded, it can be provided for use in the form of rolls, but also in the form of sheets cut to the required size. The subject laminate, though it is made up to a large extent of wood, is very advantageously fire-proof and thus not flammable.

The laminate is also water-proof, it cannot be attacked by mildews and it can be stored in a cool, dry place for an indefinite time without being subject to phenomena of dimensional, colour, or other kind of alteration.

The laminate is also sound-absorbing, and therefore well suited for masonry walls and public places.

The laminate can be glued to various supports with the use of slow adhesives with pressure drying or with rapid adhesives like Bostic; it can be polished with polyurethane- or polyester-based polishes.

It can be used for furniture, supported on faesite, plywood, multi-layers and sheet metal; it can be used on

suitably prepared masonry walls, it is very well suited to cover frames with any kind of curve or corner, for wainscoting any plane and knickknacks; it remains unchanged over time, i.e. it is not subject to the shrinking, cracking and swelling which are characteristic of normal wood.

The cost-effectiveness of the laminate with respect to normal veneering stems from the lower cost of the material (though only an expert would be able to recognise the difference), from the possibility of having it in the required size and thickness, without the wastage associated with true veneering; from the lessened need to prepare the surface for painting.

These results are obtained thanks in part to a special apparatus, which allows a high continuous hourly production of the subject laminate.

By means of the subject apparatus, it is possible automatically to prepare the starting malleable agglomerate which, once it has transited through a laminating station to obtain the required thickness, is treated to disperse volatile components either in a natural or forced way, recovering the said components for the initial recycling.

Lastly, in addition to the possible stations engraving the laminate with the desired wood grain, cutting station is also provided to finish the laminates in the desired sizes. These laminates can be collected both in the form of sheets, and of reeled rolls. In both cases, the laminates are protected by appropriate protective plastic sheaths.

Additional characteristics and advantages of the invention shall be made clearer in the detailed description which follows, illustrated purely by way of non limiting example in the enclosed drawings, in which:

- Figure 1 and 1.1 are a schematic rendition of the entire subject apparatus;
- Figure 2 shows an alternative cutting station of the subject apparatus;
- Figure 3 shows a schematic detail of the starting set for the preparation of the agglomerate, as per Figure 1;
- Figure 4 shows a schematic detail of the calendering station as per Figure 1;
- Figure 5 shows a schematic detail of the engraving station as per the apparatus in Figure 1;
- Table 1 shows the composition of the starting agglomerate in the two variants of non fire-proof and fire-proof agglomerate, with the related minimum and maximum percentages;
- Tables 2 and 2A show five sample embodiments of the starting agglomerate, of which the first three examples refer to the fire-proof agglomerate and the last two examples refer to the non fire-proof agglomerate.

With reference to the enclosed drawings and tables, the apparatus for the continuous production of

the subject laminate essentially comprises, in succession, a starting set 1 for preparing the malleable agglomerate, a laminating station 2, fed by the set 1 and able to transform the agglomerate into a thin layer 23 and a cutting station 6, able to reduce the thin layer 23 into laminates 68 of the required size.

It is appropriate first of all to define the components of the said malleable agglomerate.

It is composed, essentially, in the manner reported in Table 1. In practice its main component is a very fine wood powder, which can thus be defined as wood flour, with average granule size of about 75 micron and in a percentage ranging from 23% to 30%.

With the wood flour it is necessary to mix an adhesive of thermoplastic material, in order to provide a certain thermoplasticity to the finished product as well; the adhesive is present in a percentage ranging from 10% to 12%.

The adhesive used is vinyl resin, and in particular the adhesive designated "K115" by MONTEDISON or "MOWILITH 90" by HOECHST.

In the agglomerate are also present inert mineral charges, to render the laminate more compact and stronger, in a percentage ranging from 5% to 13%.

The agglomerate requires a lubricating agent, of the paraffin-based type, in a percentage ranging from 1 to 1.6%.

Lastly, diluting agents are necessary, which will volatilise in the course of agglomerate manufacturing, in a percentage ranging from 48% to 58%.

Should it be necessary to produce, as is clearly preferable, a fire-retarding and thus non flammable agglomerate, the components are the same as above, with the appropriate addition of fire-retarding materials, which will thus move the percentages in the way also indicated in Table 1.

Given that the agglomerate according to the present invention must be such as not to adhere to any support during the process whereby the laminate is formed with the subject apparatus, the presence of said lubricant contributes to this goal, such lubricant being specifically zinc stearate, but a contribution is also provided by the inert mineral charge of talc, always present in the agglomerate. In any case, the inert materials of the agglomerate may also be chosen among calcium carbonate (example 4), aluminium-based compounds, such as aluminium hydroxide (example 1), phosphorus-based compounds, such as ammonium polyphosphate (example 2), or silica-, carbonate-, magnesium- and manganese-based compounds, all materials present in the powder derived from diatoms, a particular type of shells (example 2). This latter component is particularly interesting, since in the agglomerate it is rather spongy and thus easily absorbs liquids for a successful agglomerate but also lets the liquids and the diluting agents easily volatilise during the drying and laminating process which will be described further on. More in particular, aluminum hydroxide can be found in the product

known as "APYRAL" BY VAW AG BOON - (GERMANY); ammonium polyphosphate can be identified with the product "exolit 422" by GREAT LAKES INDIANA - (U.S.A.); diatom powder can be found in the product "CELITE 281" by JOHN MANVILLE (U.S.A.).

The fire-proof materials pertaining to non-flammable agglomerates in particular, are chosen among bromine-based compounds, such as decabromodiphenyloxide, commercially available for instance as "DER 83" by GREAT LAKES INDIANA (example 2); antimony-based compounds, such as antimony sesquioxide (example 1); phosphorus salts-based compounds, such as ammonium polyphosphate which, as mentioned above, is also an inert charge (example 2); chlorine-based compounds, such as chloroparaffin or chlorinated paraffin, available commercially as "cloroparaffina 70" manufactured by the Italian firm CAFFARO (example 1); aluminium-based compounds such as the said aluminium hydroxide or APYRAL (example 1). This last compound is useful above all because it reduces the emission of fumes, without developing aggressive or toxic products, and its endothermic decomposition develops a large quantity of water, diluting atmospheric oxygen, without adding to unburned by-products and carbon residues.

With regard to the aforesaid lubricant, i.e. zinc stearate, it should be remembered that this product is a thermoplastic material and therefore contributes to the final plasticity of the laminate. With regard to the diluting agents, they comprise trichloroethane and turpentine in proportions which may vary approximately from 8:1 to 15:1. While trichloroethane essentially serves as a pure diluting agent, turpentine in practice acts as a solvent. In the course of the laminate formation process, these diluting agents will be eliminated from the final product by means of volatilisation and recovered to be reused in the cycle.

The examples of embodiment reported in Tables 2 and 2A entail precise percentages of products which fall within the scope of the possibilities of forming an agglomerate which is suitable for the purpose. Percentage variations according to the invention are choices made depending on the application of the final laminate, depending on the greater or lesser plasticity to be obtained and thus on how easily it is to be heat-moulded, depending on the hardness of the material to be obtained and, of course, depending on whether it is to be flammable or non-flammable. Naturally, the fire-retarding material requires more components, but it is by far preferable to the non fire-proof material. Having described the malleable agglomerate to be worked on, we shall return to the apparatus for its manufacture. The starting set 1 also uses a set 9 for triturating the wood, which is then entered into a fine grinding set 10 to obtain the said wood flour.

The starting set 1 comprises a first station 11 for the calibrated distribution of the compounds of the agglomerate which are in the solid and/or powdery state, such

as the wood flour, the vinyl resin related to the adhesive, the inert materials, etcetera, while a second calibrated distribution station 12 is destined to the compounds of the agglomerate which are in the liquid state, such as the diluting agents and, for instance, the "DER 83".

Downstream of the calibrated distribution station 11 and 12 are respective mixers 13 and 14, for mixing the compounds coming, in the exact quantity required, from the said distribution stations. Lastly, there is a kneading machine 15, which receives the various materials and is able to form the malleable agglomerate automatically and to feed it to the subsequent lamination station 2.

In particular, each calibrated distribution station is fitted, for each compound, with a containment silos 16, associated to its own device 17 for weighing the compound, in order to feed it to the corresponding mixer 13 or 14, in the pre-set, exact quantity, independently from the other compounds, through a distribution way 18 or 18'.

The mixers 13 and 14 and each weighing device 17 are commanded electrically by a microprocessor circuit 19, in order always to provide the correct doses to the kneading machine 15, regardless of the quantity required. The kneading machine 15, which is actuated by a gearmotor 151, performs its function of mixing all compounds by means of a rotating fork 152. Next to the kneading machine 15 is a stand-by tank 20 connected to it, able to store and feed material to the lamination distribution 2, replacing the kneading machine 15 during the latter's down time.

The material formed by the kneading machine 15 or coming from the stand-by tank 20 is transferred to the subsequent laminating station 2 by means of a screw conveyer 151 and 201.

The lamination station 2 instead comprises, in succession, an extruder 21, which forms an agglomerate layer formed along the horizontal direction, and a calendering station 22, able to determine the definitive thickness of the layer which will constitute the final laminate.

The calendering station 22 comprises at least a pair of motor-driven roller sets 221, 222, facing each other and oriented downward. One of them and preferably the one next to the extruder 21 (see Figure 4), is fixed, while the other one (222) is movable with respect to the first. In particular it has to create a through-passage section 211 in the agglomerate layer exiting from extruder 21, in order to reduce it to a thin thickness 23, which is the definitive one of the laminate to be obtained. Of course, the through-passage section shall be adjustable and, for example, the movable roller set can be pivoting, around a hinge 225 coinciding for instance with the axis of the roller at the larger height. The roller sets are preferably fully encompassed by continuous belts 223 and 224, which of course are movable along the direction of flow of the agglomerate layer. The two roller sets shall be moved by chains 226, motor-driven along the direction of rotation of the arrows F1 and F2.

Downstream of the calendering station 222 is a

conveyor belt 227 placed at the output side of the roller sets and able to transfer the thin agglomerate layer towards the subsequent stations.

The layer exiting the calendering station 22 could, in theory, be transferred directly to the cutting station 6, if the agglomerate layer were to be dried naturally or if waiting periods were possible. However, since this apparatus must be designed for a large hourly production, it is evident that, between the calendering station 22 and the cutting station, it is necessary to have additional stations able to accelerate the drying process of the agglomerate layer. Moreover it is always possible to produce engravings on the laminate to imitate the classic grain of the wood being worked or of another type of wood and therefore it is best to include a station 4 for engraving the agglomerate layer exiting the calendering station 22. It restores on the layer the typical grain of the wood used in the work process or it produces other grains and it is preceded, in the example depicted, by a forced ventilation station 3, which comprises at least a fan 31 and a hood 32 placed over it to collect volatilisation products and to render the agglomerate layer suitable to be permanently engraved.

The subsequent engraving station 4 comprises (see Figure 5) at least a first fixed roller 41 and a second rotating and engraved counter-roller 42, whose position with respect to the first roller can be adjusted according to the thickness of the agglomerate layer to be engraved, which passes between the two rollers. The adjustable roller is connected for instance with a hand-wheel 42 which, actuating for instance worm screws 44 which engage the support 45 of the engraved rotating counter-roller, causes it to move away from or towards the fixed roller 41.

Downstream of the engraving station 4, there is a rapid drying station 5, to disperse in a short time all the volatile products which were used to constitute an effective initial agglomerate. It comprises a ventilated chamber 51, in which one or more fans 53 send forced air inside the chamber 51, and at least one exit 54 for the volatile products, which, as shall be made clear further on, are all conveyed inside a single collection hood 7, from which the volatile products are collected by a recovery device 8, so they can be re-entered into the cycle, through the starting set 1.

Inside the ventilated chamber 51 there is a number of conveyor belts 52 stacked one above the other, along which, in a limited horizontal space, the horizontal layer can develop along a back and forth path for a large extension, in order to expose its surface for a long time to the action of the forced air circulation, which carries away with it all volatile products to be dispersed.

At the output of the drying station 5, through one or more conveyor belts T, the cutting station 6 is reached, which comprises a slitting machine 61 to determine the lateral cuts of the finished laminate, and a vertical shear 62 able instead to determine the transverse cuts of the laminate 68.

In order to protect the laminates thus produced, there is a reel 63 feeding a plastic sheath 69, also subject to the cuts made by the vertical shear 62.

Downstream of the cutting station 6 is a counter 64 for packaging the laminate, cut in overlaid sheets, vertically movable in height, in order to support a pile of laminates, each with its own plastic sheath interposed.

Since the laminate is a thermoplastic product, it can advantageously be collected in reels 66. In this case, the packaging counter 65 comprises at least one reel 66 for the collection of the laminate and of the protection sheath 69 and it also comprises at least an additional stand-by reel 67.

Moreover, since the process for laminating the subject agglomerate must unfold without any snags, the agglomerate must necessarily be insofar as possible free of adherence to the various supports it encounters during the process. This problem is for the most part solved by the paraffin-based lubricants present in the agglomerate itself and by the talc chosen as an inert mineral charge, but the apparatus itself is also provided with a design feature for this purpose. All conveyors T and the conveyors 52 of the rapid drying station 5 are made up of non-stick and fire-proof meshes. Lastly, it should be noted that the whole laminate forming process is advantageously carried out at ambient temperature, which should be no lower than 18/20°C.

Furthermore the whole apparatus, including the said microprocessor circuit 19 is run and regulated by a computerised electronic system (100), with synoptic display, which determines the adjustments of all the motor drives and/or regulation devices, such as the intervention time of the drying stations, the distances between the roller sets (221) and (222) etcetera. In practice, the computerised electronic system (100) runs and regulates the functional phases of the whole apparatus.

AGGLOMERATE COMPOSITION

TABLE 1

NON FIRE-PROOF	
COMPOUND	MIN/MAX PERCENT-AGES
wood flour	23% - 30%
adhesive	10% - 12%
inert charges	6% - 10%
lubricant	1% - 1.6%
diluting agents	48% - 58%
FIRE-PROOF	
COMPOUND	MIN/MAX PERCENT-AGES
wood flour	20% - 25%
adhesive	7% - 12%
inert charges	5% - 15%
lubricant	1% - 1.6%
fire-retarding materials	2.5% - 8%
diluting agents	48% - 58%

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EXAMPLES OF AGGLOMERATE COMPOSITION

TABLE 2

FIRE-PROOF EXAMPLE 1	
COMPOUND	PERCENTAGES
wood flour	22.8%
vinyl resin	8.9%
talc	5.5%
aluminum hydroxide	7.5%
antimony sesquioxide	2%
chloroparaffin	2%
zinc stearate	1.5%
trichloroethane	45.8%
turpentine	4%
EXAMPLE 2	
COMPOUND	PERCENTAGES
wood flour	23.8%
vinyl resin	8.65%
talc	4.9%
diatom powder	1.1%
ammonium polyphosphate	4.3%
decabromodiphenyloxide	2.7%
zinc stearate	1.6%
trichloroethane	48.65%
turpentine	4.3%
EXAMPLE 3	
COMPOUND	PERCENTAGES
wood flour	20.5%
vinyl resin	11.2%
talc	5.9%
decabromodiphenyloxide	5.75%
antimony sesquioxide	2%
zinc stearate	1%
trichloroethane	48.3%
turpentine	5.35%

TABLE 2A

NON FIRE-PROOF EXAMPLE 4	
COMPOUND	PERCENTAGES
wood flour	25.5%
vinyl resin	11.2%
talc	1%
calcium carbonate	5.2%
zinc stearate	1%
trichloroethane	52.5%
turpentine	3.6%
EXAMPLE 5	
COMPOUND	PERCENTAGES
wood flour	25%
vinyl resin	11.5%
talc	7%
zinc stearate	1%
trichloroethane	52%
turpentine	3.5%

Claims

- Apparatus for the continuous production, starting from a malleable agglomerate, of wood-based laminates for veneering and wainscoting, characterised in that it comprises at least, in succession:
 - a starting set (1) for the preparation of a malleable agglomerate composed of wood flours, adhesive and diluting agents;
 - a laminating station (2), fed by the said set (1), able to transform the agglomerate into a thin layer (23);
 - a cutting station (6), able to reduce the thin layer (23) into laminates (68) of the required size.
- Apparatus according to claim 1, characterised in that the said starting set (1) comprises at least:
 - a first station (11) for the calibrated distribution of the compounds of the agglomerate which are in the solid and/or powdery state;
 - a second station (12) for the calibrated distribution of the compounds of the agglomerate which are in the liquid state;
 - a first and a second mixer (13, 14), respectively able to provide prior mixing to the compounds

- coming, in the exact quantity required, from the said first and second distribution station (11, 12);
- a kneading machine (15), able to form the malleable agglomerate and to feed it to the laminating station (2), mixing the material coming from the first calibrated distribution station (11) with the material which gradually arrives from the second calibrated distribution station (12) for the liquid compounds.
3. Apparatus according to claim 2, characterised in that each calibrated distribution station (11, 12) is fitted, for each compound, with a containment silos (16), associated with a device (17) for weighing the compound, in order to feed the respective mixer (13, 14) with the pre-set and exact quantity of the specific compound, independently from the other compounds, by means of a corresponding distribution way (18) and (18').
4. Apparatus according to claim 2, characterised in that at least each mixer (13, 14) and each weighing device (17) are commanded electronically by a microprocessor circuit (19), so as always to provide the correct doses to the kneading machine (15), regardless of the quantity required.
5. Apparatus according to claim 2, characterised in that it is provided with a stand-by tank (20), connected to the kneading machine (15), able to store and to feed material to the laminating station (2) substituting for the kneading machine (15) and during its down-times.
6. Apparatus according to claim 1, characterised in that the laminating station (2) comprises at least in succession:
- an extruder (21) able to form a layer (211) of agglomerate developed along the horizontal direction;
 - a calendering station (22), able to determine the definitive thickness of the layer.
7. Apparatus according to claim 6, characterised in that the calendering station (22) comprises a pair at least of motor-driven roller sets (221, 222) facing each other and oriented downward, at least one of which (222) is movable, in order to determine, with respect to the other, a through-passage section adjustable according to the required lamination thickness, at least one conveyor belt (223), located at the output side of the roller sets (221, 222) and provided to transfer the laminated agglomerate layer towards the subsequent stations.
8. Apparatus according to claim 7, characterised in that each roller set (221, 222) is encompassed by a continuous-loop belt (223, 224), movable according to the direction of flow of the agglomerate layer.
9. Apparatus according to claim 6 or 7, characterised in that the movable roller set (222) pivots, with a hinge (225) in its upper part, in order to determine, on its lower side, the required through-passage section.
10. Apparatus according to claims 1 or 6, characterised in that between the laminating station (2) and the cutting station (6) a station (4) is provided for engraving the agglomerate layer exiting the calendering station (22), able to restore, on the layer, the typical wood grain, said engraving station (4) being preceded by a forced ventilation station (3), able to render the agglomerate layer suitable to be permanently engraved by dispersing a part of its volatile components.
11. Apparatus according to claims 1 or 6 or 10, characterised in that, before the cutting station (6), a rapid drying station (5) is provided, able to disperse in a reduced amount of time all volatile products from the agglomerate layer.
12. Apparatus according to claim 10, characterised in that the engraving station (4) comprises at least a first fixed roller (41) and a second engraved rotating counter-roller (42), whose position with respect to the first can be adjusted according to the thickness of the agglomerate layer to be engraved.
13. Apparatus according to claim 11, characterised in that the drying station (5) comprises a ventilated chamber (51), within which a number of conveyor belts (52) are fitted, stacked one above the other, along which, in a horizontally limited space, the agglomerate layer can develop, along a back and forth path, for a large extension, in order to expose its surface for a long time to the action of the forced air circulation, which carries away with it the volatile products to be dispersed.
14. Apparatus according to claim 1, characterised in that the cutting station (6) comprises a sitting machine (61), able to determine the lateral cuts and a vertical shear (62) able to determine the transverse cuts of the agglomerate layer, thus defining the required size of the definitive laminate (68), and at least one reel (63) for feeding a plastic protection sheath (69), also subject to the cuts of the vertical shear (62).
15. Apparatus according to claim 14, characterised in that it comprises a counter (64) for packaging the laminate, cut in overlaid sheets, movable vertically

in height.

16. Apparatus according to claim 14, characterised in that it comprises a counter (65) for packaging the laminate collected into reels, equipped with a reel (66) for collecting both the laminate and the protective sheath (69) and at least one stand-by reel (67). 5
17. Apparatus according to any one of the previous claims, characterised in that at least the transfer of the agglomerate from the starting set (1) to the laminating station (2) is accomplished by means of screw conveyers (151, 201), whereas in the subsequent stations it is accomplished by means of conveyor belts (T and 52) made up of non-stick, fire-retarding meshes. 10 15
18. Apparatus according to any one of the previous claims, characterised in that it comprises a single hood (7) for the collection of the diluting agents volatilised by the agglomerate when it is processed, and a device (8) to recover them, for their reinsertion in the cycle, through the starting set (1). 20
19. Apparatus according to claim 1, 2 or 3 characterised in that the starting set (1) also employs a set (9) for triturating the wood, subsequently inserted in a fine grinding set (10), to obtain the wood flour. 25
20. Apparatus according to any of the previous claims, characterised in that it comprises at least one computerised electronic system (100), able to run and regulate all functional phases of production. 30
21. Malleable agglomerate, according to claim 1, characterised in that it comprises at least: 35
- wood flour in a percentage ranging from 23% to 30%;
 - adhesive of a thermoplastic material, in a percentage ranging from 10% to 12%;
 - inert mineral charges, in a percentage ranging from 5% to 13%;
 - paraffin-based lubricant, in a percentage ranging from 1% to 1.6%;
 - diluting agents, in a percentage ranging from 48% to 58%. 40 45
22. Malleable agglomerate, according to claim 1, characterised in that it comprises at least: 50
- wood flour in a percentage ranging from 20% to 25%;
 - adhesive of a thermoplastic material, in a percentage ranging from 7% to 12%;
 - inert mineral charges in a percentage ranging from 5% to 15%;
 - paraffin-based lubricant in a percentage ranging from 1% to 1.6%;
 - fire-proof materials in a percentage ranging from 2.5% to 8%;
 - diluting agents, in a percentage ranging from 48% to 58%. 55
23. Agglomerate according to claim 21 or 22, characterised in that the adhesive is vynil resin.
24. Agglomerate according to claim 21 or 22, characterised in that the mineral charges are chosen among the following materials and compounds: talc; calcium carbonate; aluminium-based compounds; phosphorus salts-based compounds; silica-based, carbonate-based, magnesium-based and manganese-based compounds.
25. Agglomerates according to claim 21 or 22, characterised in that the lubricant is a thermoplastic material made up of zinc stearate.
26. Agglomerate according to claim 21 or 22, characterised in that the diluting agents comprise at least trichloroethane and turpentine in proportions which may vary approximately from 8:1 to 15:1, respectively.
27. Agglomerate according to claim 21, characterised in that it is made up at least the following components:
- wood flour;
 - vinyl resin as an adhesive;
 - talc as an inert mineral charge;
 - zinc stearate as a lubricant;
 - trichloroethane as a diluting agent and turpentine as a diluting agent - solvent.
28. Agglomerate as per claim 22, characterised in that fireproof materials are chosen among: bromine-based compounds; antimony-based compounds; phosphorus salts-based compounds; chlorine-based compounds; aluminium-based compounds.
29. Agglomerate as per claim 22, characterised in that it includes at least the following specific components:
- wood flour;
 - vinyl resin as an adhesive;
 - talc and ammonium polyphosphate as an inert mineral charge;
 - decabromodiphenyloxide and again ammonium polyphosphate, as fire-proof compounds;
 - zinc stearate as a lubricant;
 - trichloroethane as a diluting agent and turpentine as a diluting agent - solvent.

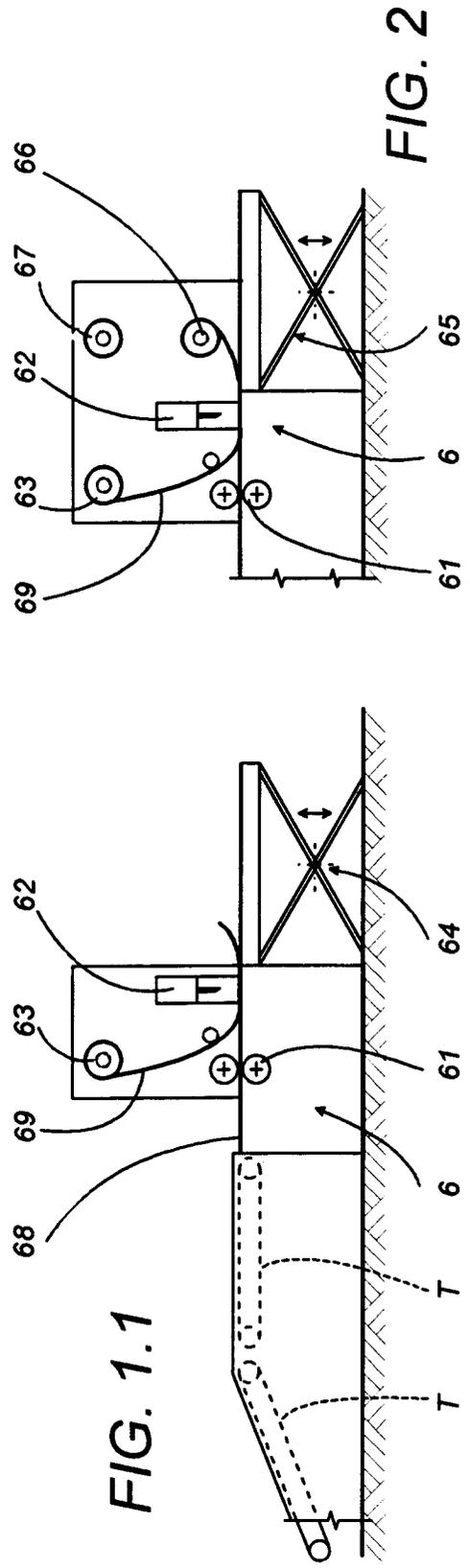
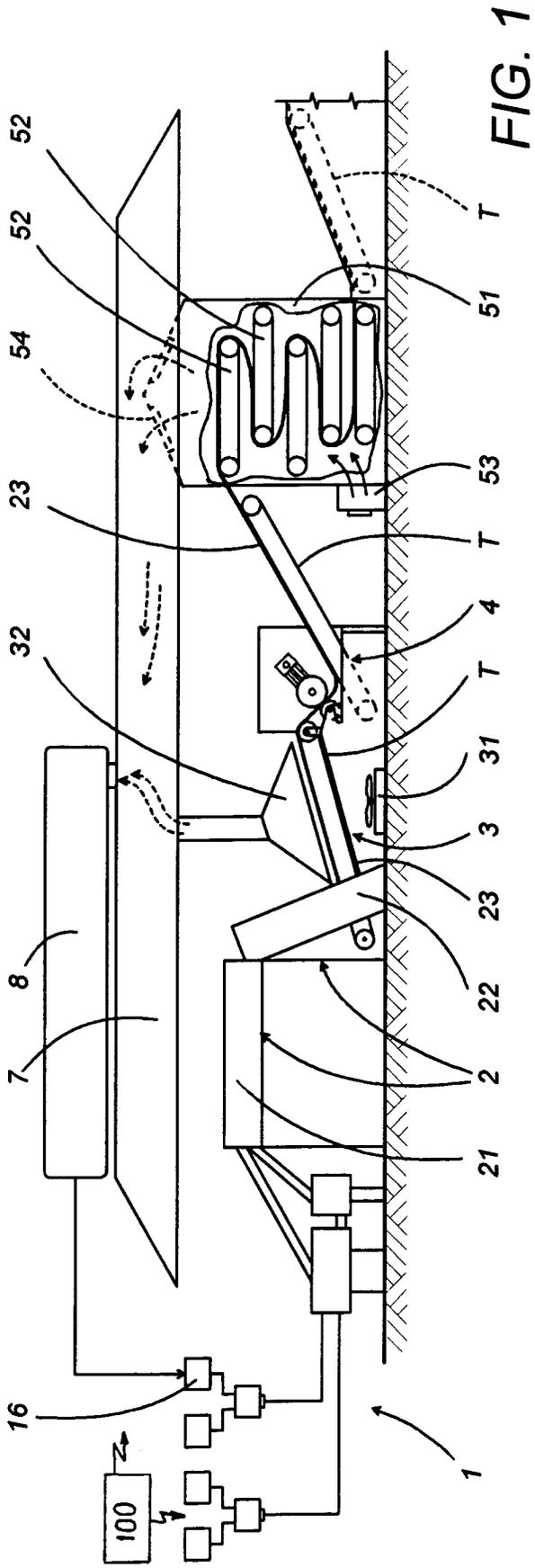
30. Agglomerate according to claim 27 or 29, characterised in that to the inert mineral charges is added a natural mineral charge, whose basic components are silica, carbonates, magnesium and manganese, obtainable from diatom powder. 5
31. Agglomerate according to claim 22, characterised in that it includes at least the following specific components: 10
- wood flour;
 - vinyl resin as an adhesive;
 - talc as an inert mineral charge;
 - decabromodiphenyloxide and antimony sesquioxide as fire-proof materials; 15
 - zinc stearate as a lubricant;
 - trichloroethane as a diluting agent and turpentine as a diluting agent - solvent.
32. Agglomerate according to claim 22, characterised in that it includes at least the following specific components: 20
- wood flour;
 - vinyl resin as an adhesive; 25
 - talc and aluminium hydroxide as inert mineral charges;
 - again aluminium hydroxide, antimony sesquioxide and chloroparaffin as fire-proof materials;
 - zinc stearate as a lubricant; 30
 - trichloroethane as a diluting agent and turpentine as a diluting agent - solvent.
33. Apparate according to any one of the previous claim, characterised in that the wood flours have a granule size of about 75 micron. 35

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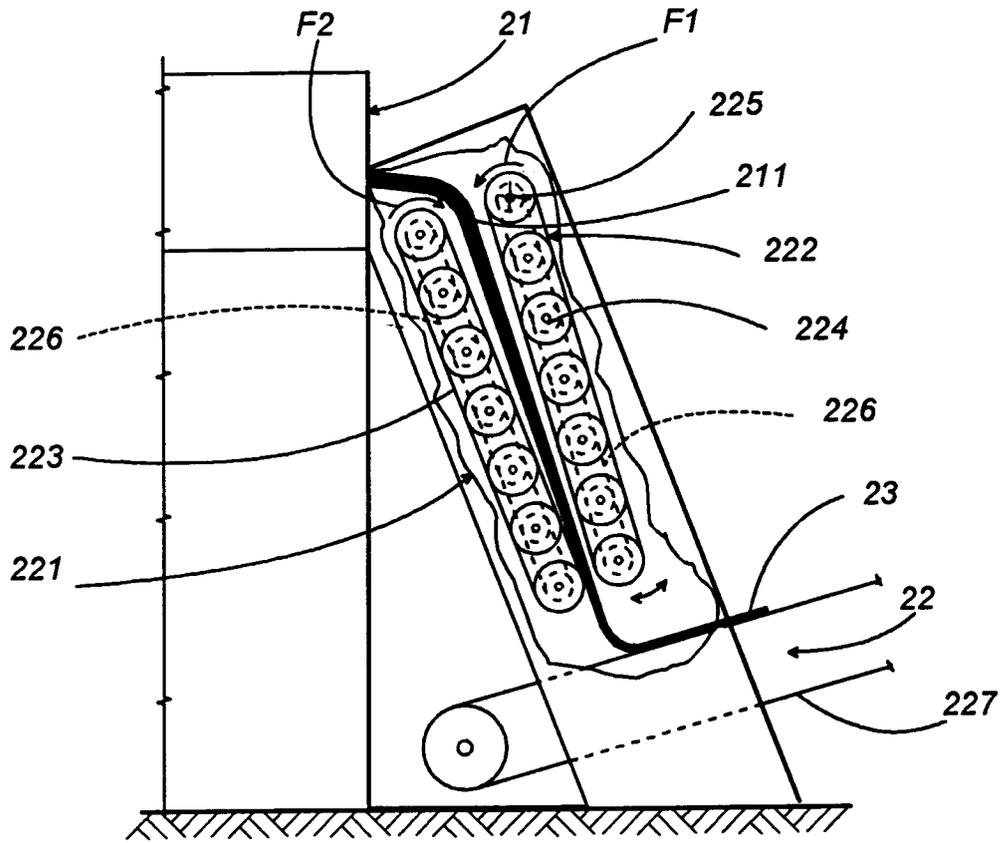


FIG. 4

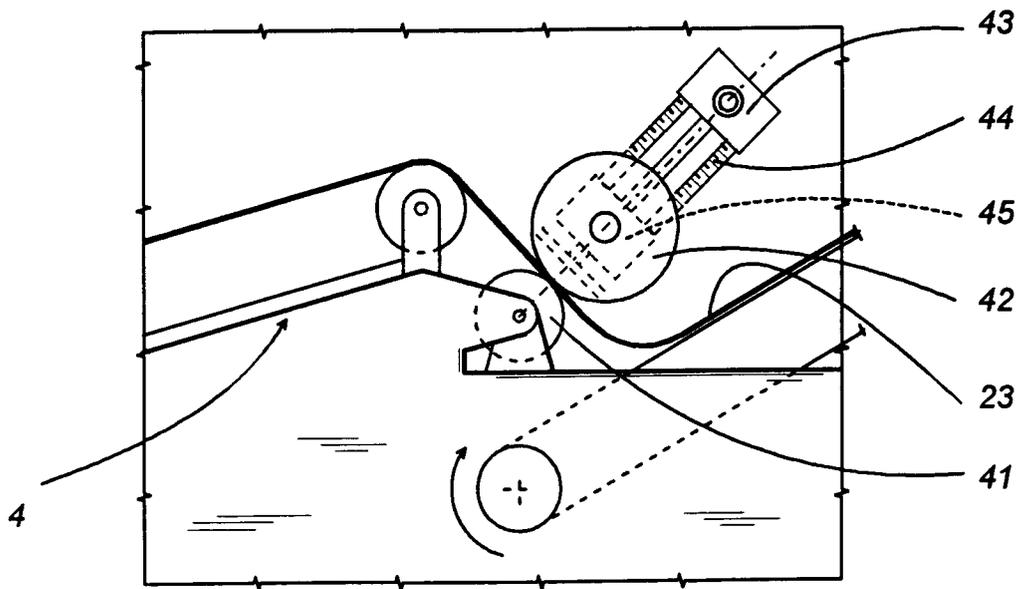


FIG. 5



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 83 0086

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP 0 426 619 A (ICMA IND COSTR MAC AFFINI) 8 May 1991 * abstract * * column 1, line 1 - line 51 * * column 2, line 47 - column 3, line 46 * * column 8, line 43 - line 50; claims *	1-20	B32B1/00 B27N3/28 B27N3/00
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A	PATENT ABSTRACTS OF JAPAN vol. 009, no. 168 (M-396), 13 July 1985 & JP 60 042009 A (SADAO NISHIBORI), 6 March 1985, * abstract *		TECHNICAL FIELDS SEARCHED (Int.Cl.6) B27N
A	GB 388 387 A (CELLULOID CORP.) 22 February 1933 ---		
D,A	GB 586 198 A (ICI LTD) 11 March 1947 -----		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 12 August 1997	Examiner Soederberg, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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