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(54) **Process and apparatus for adding glue to a flow of loose wood materials**

(57) The plant comprises a device (2) for feeding a mass of loose wood material, consisting of particles, to a loading conduit (3) of a mixer (4) provided with an inlet (4a) for the mass of wood material and an outlet (4b), and also comprises means (5) for sending a flow of air into the loading conduit (3) and means for injecting (6) glue into the mass of wood material upstream of an entry of the wood material into the mixer (4). The process comprises: feeding a mass of loose wood material in

particle form from a device (2) to a loading hopper (7) of a mixer (4); sending a flow of hot air into the hopper (7); atomising and injecting glue into the mass of loose wood material upstream of an inlet of the wood material into the mixer (4) by means of at least one injector (12) associated to a lateral surface of the hopper (7); sending the mass of wood material when mixed with the glue internally of the mixer (4); sending the mass of wood material mixed with the glue onto subsequent work stations.

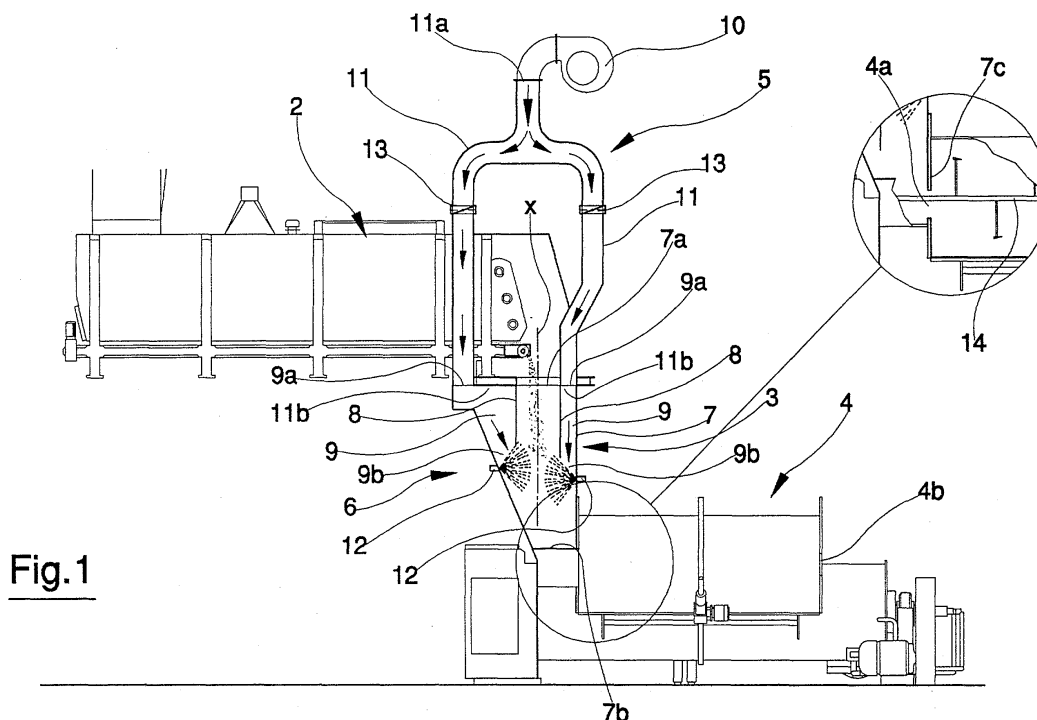


Fig. 1

Description

[0001] Loose wood materials used in processes of this type are preferably constituted by wooden chips or fibres which are mixed with glue to be made ready for use as woodchip or fibre panels.

[0002] A process and plant of this type is described in patent WO 02/066214. The plant described consists in a device for feeding loose wood materials to a mixer device, internally of which glue is sprayed onto the wood material flow through nozzles arranged in proximity of the inlet of the mixer device. The mixer device is crossed by a flow of hot air sent by special means and introduced into the mixer device at the section thereof where the glue is sprayed. The wood materials and the glue are united at the inlet of the mixer device and mixed uniformly as they pass through the mixer device, drawn by the hot air flow. The wood material mixed with the glue is thus removed from the mixer and sent on to subsequent work stations.

[0003] The described process and plant exhibit some drawbacks. The breadth of the front across which the glue is sprayed is limited to the inlet zone of the mixer device. This means that not all of the glue enters into immediate contact with the wood material, part of it being drawn by the hot air flow internally of the mixer device, where it partially unites with the wood material by effect of the mixer, but also partially sticks to the walls or the blades of the mixer, and is thus lost. The limited breadth of the front the glue is sprayed across can also lead to the formation of glue clots which do not amalgamate with the wood material. The parts of the glue which do not unite with the wood chips or fibres, drawn by the hot air flow in inlet in the mixer device, can mix up together and form clots which can form marks on the surfaces of the panels and might determine a breakdown of the physical and mechanical qualities of the panels themselves.

[0004] The main aim of the present invention is to obviate the limitations and drawbacks of the prior art by providing a process and plant for adding glue to a flow of loose wood material which obtains a homogeneous mixture and a high degree of amalgamation between the glue and the wood chips or fibres. The invention also considerably limits the loss of glue and prevents the formation of glue clots.

[0005] Further characteristics and advantages of the present invention will better emerge from the detailed description that follows of a preferred but non-exclusive embodiment of a process and plant for adding glue to a flow of loose wood materials, illustrated purely by way of a non-limiting example in the accompanying figure of the drawing, in which:

figure 1 is a schematic view of the plant according to the invention.

[0006] With reference to the figure of the drawing, 1 denotes in its entirety a plant according to the present invention. The plant comprises a device 2 for feeding a

mass of loose wood material, in the form of chips or fibres, to a loading conduit 3 of a mixer 4 provided with an inlet 4a for wood material and an outlet 4b. The plant further comprises means 5 for sending a flow of air into the loading conduit 3 and means for injecting 6 glue into the mass of wood material upstream of an entry of the wood material into the mixer 4.

[0007] The loading conduit 3 comprises a hopper 7 which exhibits at least an inlet 7a connected to the device 2 and at least an outlet 7b connected to the inlet 4a of the mixer 4. A lateral wall 7c of the hopper 7 extends partially into the mixer 4 to part the inlet 4a section and to define an internal separating wall in the mixer 4.

[0008] The hopper 7 internally exhibits at least one dividing wall 8, arranged about parallel to the longitudinal axis x of the hopper 7, which defines a channel 9 for entry of the air flow. The channel 9 exhibits an inlet 9a and an outlet 9b which is arranged upstream of the outlet 7b of the hopper 7.

[0009] The dividing wall 8 is positionable with a varying inclination with respect to the longitudinal axis x of the hopper 7 to realise a variable-section channel 9. In the illustrated embodiment there are two dividing walls 8, each of which can be inclined with respect to the longitudinal axis x in such a way that the respective channel 9 exhibits a converging or diverging orientation, according to the fluid-dynamic effect to be obtained at the outlets 9b of the channels.

[0010] The means for injecting 6 comprise at least one injector 12 associated to the hopper 7 for atomizing and injecting the glue internally of the hopper 7 in a section downstream of the outlet 9b of the channel 9 for air inlet. The injector 12 is mounted on an oscillating support so as to be orientable with a variable inclination with respect to a longitudinal axis x of the hopper 7. In the illustrated embodiment the plant comprises a plurality of injectors 12 distributed on the lateral surface of the hopper 7 in predetermined configurations. In the specific case, the injectors 12 are arranged along two parallel and opposite lines, respectively arranged on opposite sides of the hopper 7 at the channel 9 outlets. The injectors 12 are mounted on oscillating supports in order to be orientable with variable inclinations with respect to the longitudinal axis x of the hopper 7.

[0011] The means 5 for sending an air flow into the loading conduit 3 comprise at least one heat-ventilator 10 a delivery of which is connected to an inlet 11a of at least one conveyor conduit 11. The conveyor conduit 11 exhibits an outlet 11b which is connected to the inlet 9a of the channel 9. At least one delivery regulator 13 is located on the conveyor conduit 11, which regulates the inlet air delivery into the hopper 7. Figure 1 illustrates two conveyor conduits 11 with respective delivery regulators 13, each of which leads to a respective channel 9.

[0012] With reference to the described plant, the process of the invention comprises the following stages.

[0013] A mass of loose wood material is fed from the

device 2 into the hopper 7 loading the mixer 4, which mixer has an inlet 4a for the wood material and an outlet 4b. Together with the wood material, the hopper 7 receives a hot air flow from the heat-ventilator 10 the delivery of which is connected to the conveyor conduit 11.

[0014] The conveyor conduit 11 opens into the channel 9 which is arranged internally of the hopper 7. The glue is injected and atomised onto the mass of wood material upstream of an entrance of the wood mass into the mixer 4; at least one injector 4 sends the glue onto the wood mass, which injector 12 is associated with the lateral surface of the hopper 7 in a downstream section thereof and on a same side thereof as the outlet 9b of the channel 9. The air flow issuing from the outlet 9b has a containing action on the flow of wood material and realizes a compact front onto which the atomized glue is sprayed. The mass of wood material mixed with the glue passes from the hopper 7 internally of the mixer 4 where a mixer shaft 14 mixes the wood material, homogenising the distribution of the glue. The lateral wall 7c prevents the wood material mixed with the glue, drawn by the air flow, from being moved towards the outlet 4b of the mixer 4 as soon as it enters the inlet 4a, keeping it confined in a limited zone within the mixer 4. The function of the lateral wall 7c is to make the wood-glue mixture distribute uniformly inside the mixer 4, filling the volume of the mixer 4 completely. The wood-glue mixture is then sent on to following work stations, exiting through the outlet 4b of the mixer 4.

[0015] For a better glue distribution, the glue can be injected and atomised through a plurality of injectors 12, distributed over the lateral surface of the hopper 7 in predetermined and orientable configurations with variable inclinations with respect to the longitudinal axis x of the hopper 7. In the illustrated example in figure 1 the injectors 12 are arranged in two parallel rows and are opposite, being respectively aligned in a section downstream of the outlet 9b of a respective channel 9. The glue is sprayed onto the mass of loose wood material on two opposite fronts, increasing the fraction of wood particles that enter directly into contact with the glue.

[0016] The plant and process described offer two important advantages: the structure of the hopper 7 loading the mixer 4 and in particular the presence of the channel or channels 9, which thanks to the position of the respective outlets, enable the glue to be sprayed on a compact front of wood material. The fraction of glue which does not enter into contact with the chips or fibres is considerably reduced with respect to the prior art, with a consequent saving in glue volume used. As the drops of glue which do not enter into contact with the chips or fibres are limited in number, the risk that glue clots can form internally of the mass of wood materials is considerably reduced.

[0017] Thanks also to the compacting action of the flow of air internally of the hopper 7, the glue is well-distributed throughout the wood material. The panels obtained using the mixture produced by the described

plant and process are therefore of a high quality, with obvious production cost savings.

5 Claims

1. A plant for adding glue to a flow of loose wood materials, **characterised in that** it comprises a device (2) for feeding a mass of loose wood material, consisting of particles, to a loading conduit (3) of a mixer (4) provided with an inlet (4a) for the mass of wood material and an outlet (4b), and also comprises means (5) for sending a flow of air into the loading conduit (3) and means for injecting (6) glue into the mass of wood material upstream of an entry of the wood material into the mixer (4).
2. The plant of claim 1, **characterised in that** the loading conduit (3) comprises a hopper (7) which exhibits at least one inlet (7a), connected to the device (2), and at least one outlet (7b), connected to the inlet (4a) of the mixer (4), and has internally thereof at least one separating wall (8) arranged parallel to a longitudinal axis (x) of the hopper (7), which separating wall (8) defines a channel (9) for entry of the flow of air, which channel (9) has an inlet (9a) and an outlet (9b), the outlet (9b) being arranged upstream of the outlet (7b) of the hopper (7), a lateral wall (7c) of the hopper (7) extending for a tract thereof internally of the mixer (4) in order to divide a section of the inlet (4a) and to define an internal separating wall internally of the mixer (4).
3. The plant of claim 2, **characterised in that** the separating wall (8) is positionable with a variable inclination with respect to the longitudinal axis (x) of the hopper (7), realising a channel (9) having a variable section.
4. The plant of claim 3, **characterised in that** the means for injecting (6) comprise at least one injector (12) associated to the hopper (7) for atomizing and injecting the glue internally of the hopper (7) at a section thereof downstream of the outlet (9b) of the channel (9) for inlet of the flow of air, the injector (12) being orientable with a variable inclination with respect to the longitudinal axis (x) of the hopper (7).
5. The plant of claim 4, **characterised in that** it comprises a plurality of injectors (12) distributed over a lateral surface of the hopper (7) in predetermined configurations, the injectors (12) being orientable with variable inclination with respect to the longitudinal axis (x) of the hopper (7).
6. The plant of claim 5, **characterised in that** the means (5) for sending a flow of air into the loading conduit (3) comprise at least a heat-ventilator (10),

a delivery of which is connected to an inlet (11a) of at least one conveyor conduit (11), the at least one conveyor conduit (11) having an outlet (11b) connected to the inlet (9a) of the channel (9).

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7. The plant of claim 6, **characterised in that** it comprises at least one delivery regulator (13) arranged on the conveyor conduit (11) for regulating the flow of air in inlet to the hopper (7).

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8. A process for adding glue to a mass of loose wood material in particle form, **characterised in that** it comprises following stages:

feeding a mass of loose wood material in particle form from a device (2) to a loading hopper (7) of a mixer (4) provided with an inlet (4a) for the mass of loose wood material and an outlet (4b);

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sending a flow of hot air into the hopper (7) by means of a heat ventilator (10) a delivery of which is connected to a conveyor conduit (11) opening into a channel (9) arranged internally of the hopper (7);

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atomising and injecting glue into the mass of loose wood material upstream of an inlet of the wood material into the mixer (4) by means of at least one injector (12) associated to a lateral surface of the hopper (7) at a section thereof downstream of and on a same side as an outlet (9b) of the channel (9) so that the flow of hot air exiting from the outlet (9b) performs a containing action on the mass of wood material, making a compact front onto which the glue is atomised and sprayed;

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sending the mass of wood material when mixed with the glue internally of the mixer (4) where a mixer shaft (14) is located for mixing and making homogeneous a distribution of the glue;

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sending the mass of wood material mixed with the glue onto subsequent work stations through the outlet (4b) of the mixer (4).

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9. The process of claim 8, **characterised in that** the glue is injected and atomised by a plurality of injectors (12) distributed on a lateral surface of the hopper (7) in predetermined configurations, the plurality of injectors (12) being orientable with variable inclinations with respect to a longitudinal axis (x) of the hopper (7).

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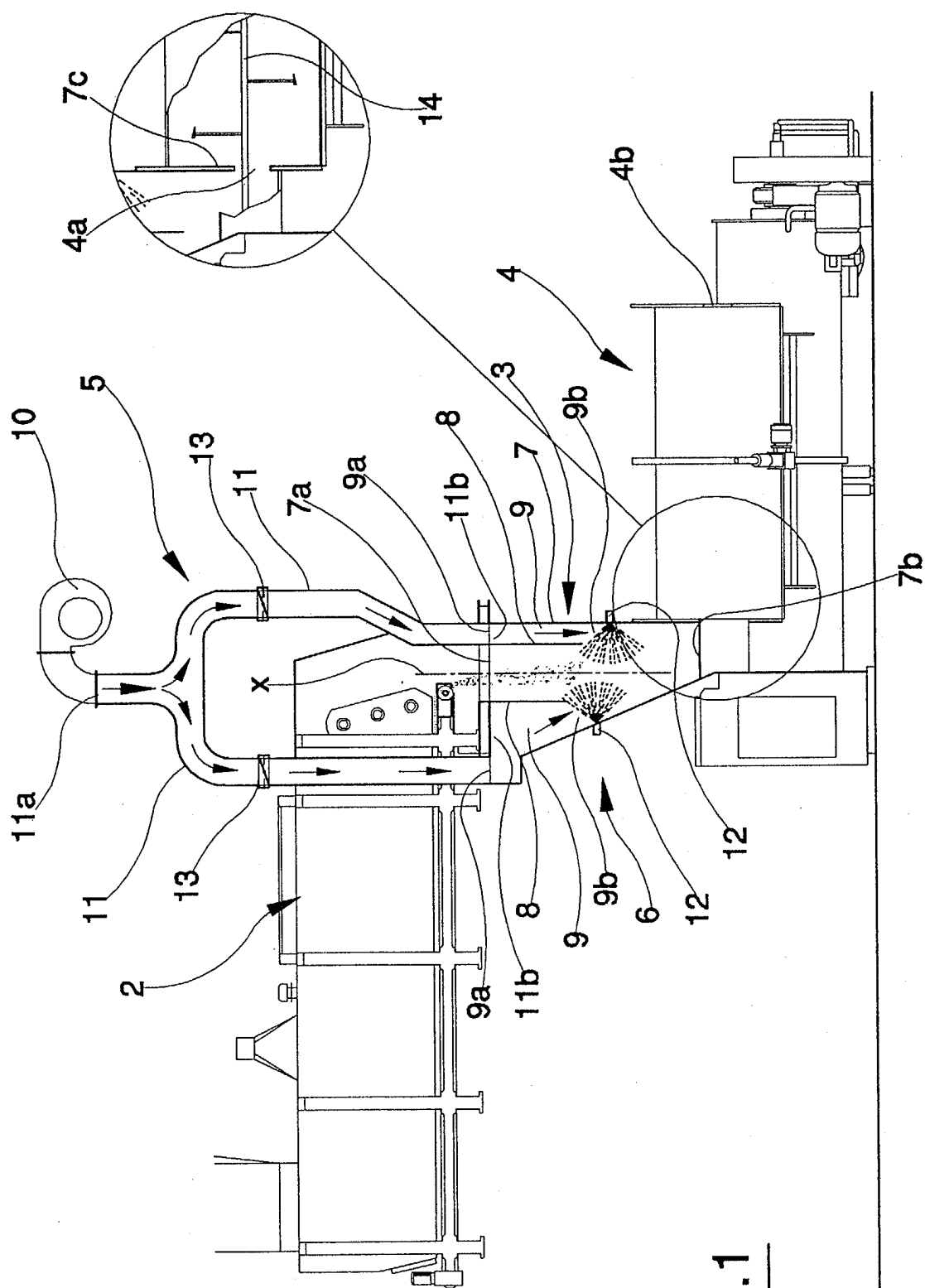


Fig. 1