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(54) A METHOD AND DEVICE FOR PRODUCING A LAYER

(71) We, CARL SCHENCK AG of Landwehrstrasse 55, Darmstadt 61, Federal Republic of Germany, a German Body Corporate,

do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

The invention relates to a method and an apparatus for producing a layer comprising wood chips or fibres by means of a scattering station and a weighing device.

An essential aspect in the production of chipboard or fibre board is to achieve uniformity of weight of the finished product. With regard hereto it has already been proposed (German Auslegschrift 1, 156, 219) that samples should be used as a basis for determining the specific gravity, these samples being cut out, in known manner from the chip layer between sections to be compressed, these sections corresponding, according to their length and width, to the capacity of a chipboard press.

This method is expensive. Furthermore there is a very slow control process which is only able to follow very slow changes in the layer, and this is caused by the long dead period between scattering and weighing. When scattering multi - lamina layers the individual laminae cannot be corrected.

The invention seeks, therefore, to propose a method and apparatus whereby access to control is achieved during scattering of the individual laminae of the layer.

In accordance with a first aspect of the invention there is provided a method of manufacturing a layer comprising building up the layer by scattering material by means of scattering machines, weighing the layer between two scattering machines and controlling one or more of the scattering machines in dependence on the weight detected and the desired weight.

The weighing may be carried out using a calibrated weighing device which produces electrical signals related to the weight measured. The first scattering machine and the last scattering machine may be controlled.

A particular advantage comprises that with the aid of a single weighing device the throughput from two scattering machines may be controlled simultaneously to give a predetermined desired weight value of the finished layer.

A particularly advantageous refinement of this method consists in the fact that the electrical signals may control the throughput of at least one scattering machine between the first scattering machine and the last scattering machine to produce a desired weight value of the finished layer. This refinement makes it possible to compensate for any fluctuations arising in one part of the layer by means of changes in the next part of the layer and thus to obtain a layer which, after leaving the scattering apparatus without any further contact, for example smoothing or removal of layer material for the purpose of evening out of the weight, may be further processed immediately, for example by pressing.

In yet another refinement of the method in accordance with the invention, it is proposed that the throughput of another scattering machine may be controlled by signals emanating from a further calibrated weighing device in dependence on the weight of the complete layer. The special advantage of this refinement comprises the fact that the evening out of the layer may be carried out within the intermediate layers. Thus it is particularly advantageous if the scattered parts of the layer produced by different scattering machines are formed from a different material and if the desired weight balance of the finished layer is to be achieved by controlling an intermediate scattering machine(s). This has its particular advantage in that the finished layer is passed

over a calibrated weighing machine, and the error in scattering is recognised within the shortest possible time, or at least within the time which a layer section requires in order to pass over the calibrated weighing machine, so that, with the lowest possible wastage, achievement of a finished board of constant weight is immediately facilitated and moreover complete supervision of the layer to be pressed is possible.

According to a second aspect of the invention, there is provided apparatus for manufacturing a layer comprising a plurality of scattering machines, weighing means for weighing the layer between two scattering machines and control means for controlling the operation of one or more of the scattering machines in response to the weight detected by weighing means and a desired weight value.

The weighing means may comprise support plates supported at least on one load cell and on two supports, over which plates a belt carrying the layer is passed.

The invention will now be described in greater detail, by way of example with reference to the drawings, which show the manufacture of a chipboard layer. However, the invention is not restricted to those manufacturing processes, but may also be used equally well in the same manner for manufacturing fibre layers or layers comprising chips and fibres.

In the schematic drawings:-

Figure 1 shows a weighing device,

Figure 2 shows a multi-layer scattering station having weighing devices.

The layer 1 which is scattered on to flexible base-plates 2 in a scattering station, not shown in Figure 1, is transported, including the base plates 2, via a weighing device. The weighing device itself comprises two supports 5, 6 connected pivotably to a support 3, 4 respectively, these supports 5, 6 also being supported on a load cell 7. In a preferred refinement, the load cell is arranged on a cross-member 8 connecting the supports 3 and 4 between the forward running side of a moulding belt transport chain 9 and the rearwardly running side of the moulding belt transport chain, which transports the baseplates 2 by means of flights 10. Instead of the device shown in Figure 1 having flexible base layers and chains as drawing means, an endless transporting belt may be used comprising, for example, textiles, plastics or steel as a carrier base for the layer. Similarly, plates transported by means of a conveyor device may also be used as carrier bases. As a result of the forces acting on the single load cell 7 shown in the embodiment, this emits an electrical signal which is directly proportional to the weight of the chips located on the supports 5, 6 of the weighing device. This signal showing the actual value in the scattering machine control circuit is electrically amplified and indicated. Thus the weight of the supports 5, 6 and the base layers 2 is calibrated with the aid of a calibration weight 12 and/or electrically.

The multi-layer scattering station shown in Figure 2 comprises two scattering stations 14 and 17 providing the covering layer part, a middle layer part scattering station 16, a weighing device 15 arranged between the covering layer part scattering station 14 and the middle layer part scattering station 16, a weighing device 20 arranged after the covering layer part scattering station 17, a separating arrangement 21 and a moulding belt 18.

The covering layer part scattering station 14 comprises a scattering machine constructed as an air scattering chamber in this embodiment, by means of which a covering layer part is distributed on to the mould belt 18, the layer being passed over a weighing device 15 described in greater detail in Figure 1 immediately after scattering. Because of the electrical signals of the weighing device 15, either the output quantity from the middle layer scattering station 16 may be changed so that a predetermined desired weight is created or the second covering layer scattering station 17 may be controlled to provide a predetermined desired weight in accordance with the electrical signals. However, it is also conceivable that the two covering layer part scattering machines are controlled to provide a desired weight, the middle layer scattering station 16 being uncontrolled. Thus after the first covering layer scattering station 14, the weighing device 15 ascertains the weight per metre of the lower covering layer part. This value is constantly compared to a predetermined desired value. When there are deviations, then with the aid of a controller, the throughput quantities of the scattering machines of the covering layer part scattering stations 14 and 17 equipped, for example with direct current drives which controlled as to rotational speed, are changed. Thus both covering layer part scattering stations 14, 17 are influenced to the same extent. As it is a question of two identical machines which furthermore have the same throughput characteristics when there is the same chip material, then both covering layer part scattering stations 14 and 17 are controlled by a single weighing device 15. In this control circuit the control slope is influenced by the mould belt speed as a parameter.

If instead of the control of the two covering layer part scattering machines of the scattering stations 14, 17 a control should be operated to provide the desired weight using the middle layer part scattering station 16, then the signals of the weighing

device 15 are used to adjust the throughput devices of the scattering station 16. Under the condition that, as described above, the two covering layer part scattering stations 14, 17 have a constant volume throughput, a chip layer may be produced having constant weight with a single weighing device 15, the weighing device 20 having been dispensed with. The weighing device 15 is located between the first covering layer part scattering station and the middle layer part scattering station 16.

It is advantageous if scattering of the lower and upper covering layer part is carried out constantly and uninfluenced by control processes which correspond to a change in the thickness of the covering layer part. Then, particularly if the middle layer part is manufactured by means of several middle layer part scattering machines, which are arranged one behind the other, and the calibrated weighing device 15 is arranged between two middle layer part scattering machines of the scattering station 16, the electrical signal which deviates from the desired value is then used to readjust the throughput of one of these middle layer part scattering machines. If the signal emanating from the weighing machine reaches such a level that the error made by erroneous middle layer part scattering cannot be balanced out by means of a single middle layer part scattering machine then it is to be regarded as particularly advantageous within the framework of the invention if the calibrated weighing device 15 is arranged between the last middle layer part scattering machine and the covering layer part scattering station 17, so that, as a result, the signals emanating from the calibrated weighing device 15 may be passed to more than one scattering machine of the middle layer part scattering station 16. In a particularly advantageous manner the chip layer is produced so as to be of constant weight by means of a single weighing device.

The weighing devices 15, 20 shown in Figure 2 may be used in a particularly advantageous manner if the weighing device 15 controls the two covering layer part scattering machines of the scattering stations 14, 17 at a constant weight, throughput, while the weighing device 20 arranged thereafter controls the middle layer part scattering station 16 to provide a desired weight value. Larger errors occur, as we know from experience, in the region where scattering of the middle layer part takes place, these errors being based mainly on changes in the bulk density as a result of varying types of wood and possibly also because of blade changes during useful blade life during chip production. Then it is necessary that the middle layer part scattering machine(s) of the scattering station 16 should be so changed in their throughput quantity when there are deviations between the desired and actual weight value of the moulded part, that wastage is avoided. This can be solved using the above described embodiment of the invention by means of a control circuit which, besides taking into account the control, deviation, i.e. the deviation between the desired and actual value of the weight of the layer, also takes into account the relationship between the covering layer parts, and middle layer part of the moulded layer, and furthermore the moulding belt speed and the middle layer part throughput quantity. Thus it is achieved that when there are independent changes in the factors then the control circuit remains optimally matched in its characteristics in accordance with the production programme.

The weighing device 20 arranged after the covering layer part scattering station 17 may also be connected to a registering device, not shown, on which the weight per unit area is continuously registered so that as a result very good monitoring characteristics and a comparison between the scattered chippings and the finished chipboards is made possible. The chip layer is divided up into appropriate raw pieces of chipboard by means of the separating arrangement 21 which is connected thereafter, these raw pieces of chipboard are then compressed in a press, not shown, so as to form chipboards.

WHAT WE CLAIM IS:-

1. A method of manufacturing a layer comprising building up the layer by scattering material by means of scattering machines, weighing the layer between two scattering machines and controlling one or more of the scattering machines in dependence on the weight detected and the desired weight.

2. A method according to claim 1, wherein the weighing is carried out using a calibrated weighing device which produces electrical signals related to the weight measured.

3. A method according to claim 2, wherein the throughput of both the first scattering machine and the last scattering machine are controlled.

4. A method according to claim 2, wherein the electrical signals control the throughput of at least one scattering machine arranged between the first scattering machine and the last scattering machine.

5. A method according to claim 1 to 3, wherein the throughput of another scattering machine is controlled by signals emanating from a further calibrated weighing device in dependence on the weight of the complete layer.

6. Apparatus for manufacturing a layer

comprising a plurality of scattering machines, weighing means for weighing the layer between two scattering machines and control means for controlling the operation of one or more of the scattering machines in response to the weight detected by the weighing means and a desired weight value.

7. Apparatus according to claim 6, wherein the weighing means comprise support plates supported on at least one load cell and on two supports, over which plates a belt carrying the layer passes.

8. A method of manufacturing a layer substantially as described herein with reference to the drawings.

9. Apparatus for manufacturing a layer substantially as described herein with reference to the drawings.

For the Applicants,
J. F. WILLIAMS & CO.,
Chartered Patent Agents,
113 Kingsway,
London WC2B 6QP.

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1567460 COMPLETE SPECIFICATION

2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

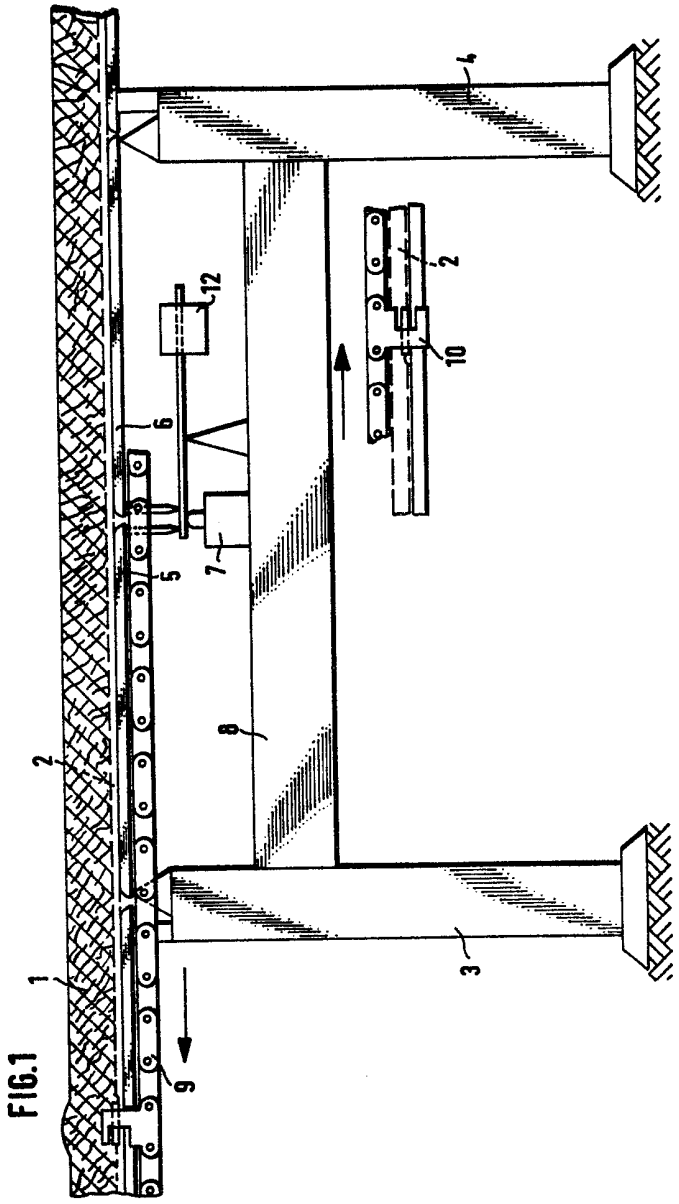

FIG.1

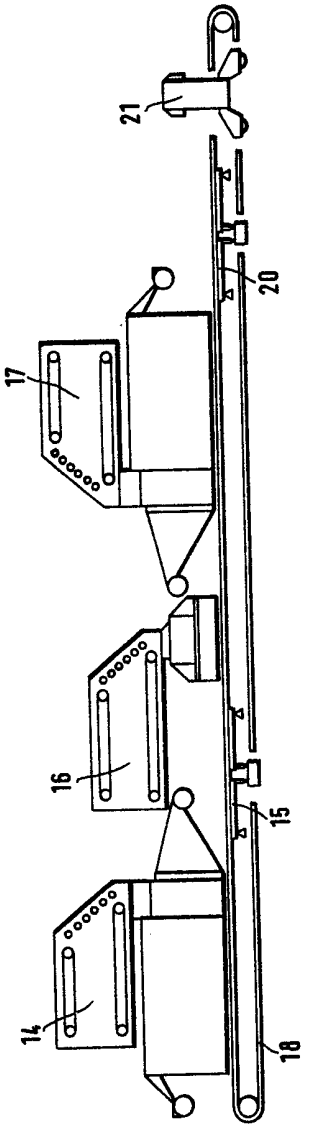

FIG.2