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(54) **Lignocellulózt tartalmazó, lemez alakú anyag gyártására szolgáló eljárás és eszköz**

The present invention relates to a method for producing a lignocellulose-containing sheet-type material, for example a wood-based sheet, wherein a sheet-type pressed body with a top principal surface, a bottom principal surface and at least one narrow side surface is produced by pressing lignocellulose-containing material provided with binder under raised pressure and at raised temperature.

Furthermore, the invention relates to a device for producing a lignocellulose-containing sheet-type material, for example a wood-based sheet, with a pressing device which is configured for the pressing of small-sized material, in particular particles such as wood chips, wood strands and/or wood fibres glued with a binder, under raised pressure and at raised temperature, and for producing a pressed sheet with a top principal surface, a bottom principal surface and at least one narrow side surface.

Moreover, the invention relates to a lignocellulose-containing sheet-type material, for example a wood-based sheet, which is produced by a corresponding method.

Finally, the invention relates to a use of a lignocellulose-containing sheet-type material, for example a wood-based sheet, which comprises a sheet-type pressed body with a top principal surface, a bottom principal surface and at least one narrow side surface.

A lignocellulose-containing, sheet-type material is understood to mean a component which predominantly contains wood particles and/or lignified plant material (e.g. straw). Wood particles can be, amongst other things, wood chips, wood strands (long wood shavings), wood fibres and wood dust. With the addition of a binder, sheet-type materials (sheet-type components) are produced by pressing the lignocellulose-containing material, in particular the wood particles.

During or after production, the sheet-type components, for example sheets made of wood-based material, are provided with a marking which has an identifying character. The marking should for example provide information with regard to the properties that the sheet-type component possesses, the quality it has, where, when and by whom it has been manufactured and the purpose for which it is intended.

Various methods are known from the prior art for providing a sheet-type component with a marking.

For example, it is possible to apply an adhesive label on a part of the sheet-type component. An adhesive label comprises an upper material of paper and an adhesive layer applied at the underside. The adhesive label can be printed with the desired data. For the application of the adhesive label, all the surfaces, i.e. the front side (top principal surface), rear side (bottom principal surface) and the side edge (narrow surface), of a sheet-type component can in principle be considered for the application of the adhesive label. This type of marking, however, is bound up with various drawbacks. The

provision of an adhesive label as an additional data carrier is cost-intensive. Furthermore, the application of adhesive labels on the corresponding section of the component is associated with high time consumption. It is possible that the adhesive labels, for example if there is insufficient adhesive effect or due to external influences, become detached again, as a result of which the marking is lost. If the adhesive labels are applied on the front side or rear side of a sheet-type component, they possibly have to be removed again before the use of the sheet-type component, in order to avoid aesthetic impairment of the front side or rear side. This is a drawback for example with laminate-coated panels, since a specific, preferably aesthetically perfect, pattern is usually intended to be visible on their front side.

Moreover, the stackability of sheet-type components which carry an adhesive label on the front or rear side is limited. On the one hand, a raised region is formed by the adhesive label, which can lead to instability of the stack in the case of a plurality of sheet-type components arranged in two-dimensional contact with one another due to the contact surface thus being reduced. On the other hand, a dead volume is created by the raised region, which increases the space requirement of the stack beyond the sum of the thicknesses of the individual sheet-type components. The application of an adhesive label on a narrow surface of a sheet-type component, on the other hand, is unfavourable, since only a very small area for application is available on a side edge. Moreover, the application of an adhesive label on a side edge may also be made more difficult if the side edge comprises a profile.

Furthermore, it is known to print a marking on the front side or rear side of a sheet-type component. However, a print must also be removed again before the use of the sheet-type component, in order to avoid aesthetic impairment. Moreover, a print comprising ink must first be dried, for example before stacking of the printed sheet-type components takes place, because otherwise there is the risk of the printing ink being smudged and of the marking thus being made unidentifiable and/or of adjacent sections of the front side or rear side being stained.

Methods with which durable, i.e. non-removable, markings can be provided on the front or rear side, for example by burning-in by means of a laser, are not preferred, since they take up a lot of time and are only expedient if the aesthetic form of the front or rear sides is unimportant for the use of the sheet-type component.

A further possibility for marking a sheet-type component consists in applying the desired data in written characters (letters, numerals, etc.), i.e. in plain text, on a side edge of a sheet-type component. The reading direction of the plain text runs in this case along the extension direction of the side edge on which the plain text is applied. This mode of procedure, however, is only practicable if the sheet-type component has a thickness sufficient for the application of plain text in a legible size. This means, on the one hand, that the height of the written characters has to be smaller than the thickness of the sheet-type component and, on the other hand, that the written characters have to be arranged centred

crosswise to the extension direction of the side edge in order to avoid impairment of the written image.

Especially when sheet-type components made of wood or a wood-based material have a small thickness, it is scarcely possible on account of the surface quality (surface roughness) to apply a sequence of fine written characters legibly on the side edges.

It is known from DE 10 2007 058 029 A1 to arrange a plurality of sheet-type components which have a thickness of less than 5 mm in two-dimensional surface contact to form a stack, in which the principal surfaces of adjacent components touch each other and the narrow side surfaces of the components together form a lateral surface of the stack. This lateral surface of the stack is provided, for example printed, overall with a marking. Each narrow side surface is intended to contain a part of the marking. The individual narrow surfaces are so thin that they cannot be printed individually. It is not therefore possible to provide individual sheet-type components with individual markings which relate to, i.e. identify, only these individual components. The markings form a barcode, which runs over the entire narrow surfaces that form of a narrow side of the stack.

Such a barcode, however, has the drawback that it has relatively large dimensions compared with the data quantity encoded with it. A further problem is that, due to the inevitable absorption capacity of the wood particles at the narrow side surfaces, a marking applied, for example printed, on the narrow side of the stack is then no longer identifiable, at least no longer

completely identifiable, on the some of the narrow surfaces. Furthermore, it may happen that markings, if they are applied too fine, cannot then be satisfactorily identified on account of the surface structure (typography). Parts of the marking can even disappear completely in the course of time, for example if wood-based material breaks away at the edges in the presence of loading. Moreover, all the sheets of the stack have the same marking, so that individual marking is not possible. Finally, the marking does not become possible until a stack of a plurality of sheets is formed.

It is further known from DE 10 2010 053 081 A1 to provide a sheet-type component with an RFID transponder, in which the data concerning the component (in particular identifying the component) are stored. The use of such an RFID transponder is expensive and cost-intensive. Moreover, this is not suitable for every type of sheet, every sheet thickness and every use of the sheet.

It is an object of the present invention to produce a lignocellulose-containing sheet-type material, which permits in a straightforward manner the linking of data relating to the lignocellulose-containing sheet-type material with the respective lignocellulose-containing sheet-type material.

The object derived and indicated above is solved according to a first teaching of the present invention by a method for producing a lignocellulose-containing sheet-type material according to claim 1.

When, in the present description, mention is made of a raised temperature and a raised pressure, this is intended to mean that the pressure (pressing pressure, contact pressure) is higher than the ambient pressure and the acting temperature is higher than the ambient temperature.

In other words, the edge strip is constituted such that it can be printed with a resolution of at least 60 dpi (dots per inch), preferably at least 120 dpi, particularly preferably at least 180 dpi, i.e. the optical code is printed or imaged in this resolution on the edge strip. The roughness (roughness according to Bendtsen, Parker Print Surf and/or Bekk) of the edge strip at least on one side, in particular on the printed side, in particular on both sides, is less than that of the narrow surface onto which the edge strip is applied. Due to the fact that an edge strip, which can be printed with the previously defined resolution and/or which has a roughness on at least the printed side that is less than that of the narrow surface, is applied on the narrow side surface or on one of the narrow side surfaces, i.e. on a surface connecting the principal surfaces of the sheet-type pressed body (the pressed sheet), a narrow-side surface is created which can be printed better than the uneven and porous narrow surface of the pressed body. As mentioned, the roughness at least on one side of the edge strip is less than that of the narrow surface of the pressed body. This side is the side which is printed with the code and subsequently points away from the pressed body. It is therefore no longer necessary for the desired data relating to and in particular identifying the lignocellulose-containing sheet-type material, for

example data concerning the properties, the quality, the processing steps that have taken place and/or are due to take place, the processing location, the processing time, the processor, the intended use, legally required markings such as the CE mark or the timber certification or timber origin marks (PEFC, FSC) etc., to be printed on adhesive labels and for the latter then to be glued onto the given component or the lignocellulose-containing sheet-type material; if an adhesive label is glued onto one of the principal surfaces according to the prior art, this represents, as mentioned, an aesthetic impairment of the principal surface, and if the adhesive label is glued onto the narrow surface, insufficient adhesion is produced. According to the invention, on the other hand, an edge strip is glued to the narrow surface in such a way and the edge strip is constituted in such a way that it can cover, in a durable manner, the narrow surface of the pressed body and therefore the roughness of the narrow surface. According to an embodiment, it is conceivable for the adhesive, for example synthetic resin or glue, to penetrate into pores (i.e. the intermediate spaces between the fibres and filler particles of the material) of the pressed body and/or for unevennesses in the surface of the pressed body to be filled and thus levelled out, as a result of which optimum bonding between the edge strip and the narrow surface of the pressed body is achieved. In particular, the edge strip can be pressed onto the narrow surface under raised pressure (contact pressure) and at raised temperature.

As a result of the smoother narrow-side surface which the lignocellulose-containing sheet-type material acquires by means of the edge strip and which can be printed in a

higher resolution compared to the original wood surface, much more data as code can be applied on the narrow surface than in the case where the narrow surface is not provided with an edge strip. The code can thus be printed on the surface in a much higher resolution and also very much smaller than is possible in the prior art. As a result of the possibility being created of printing in a particularly high resolution, modern types of code, for example matrix codes, which permit a high information density, can also be used. This in turn creates the possibility of applying much more data concerning processing steps, intended uses etc., including successively one after the other.

Finally, each lignocellulose-containing sheet-type material can be linked and printed with individual data in the inventive manner, which simplifies the handling of the lignocellulose-containing sheet-type materials during and after production significantly compared to the prior art.

According to an embodiment of the method according to the invention, the edge strip is provided or produced in a thickness of at most 2 mm, particularly preferably at most 1 mm. Such a thickness is completely sufficient to fill and thus level out the unevennesses caused by the roughness on the narrow side of the pressed body and to create a flat surface that can be printed on in the optimum manner. It should be noted that the thickness of the edge strip, after the application of the edge strip on the narrow surface of the pressed body, may at least in sections be less than previously and therefore less than the aforementioned values, this being caused by the

fact that the material of the edge strip is pressed into the pores or depressions forming the roughness or unevenness.

According to a further embodiment of the method according to the invention, the edge strip can also be made available as material in roll form, which can be brought about in a straightforward manner especially with the previously described thickness values of the edge strip. A material in roll form, i.e. a rolled-up edge strip, can be transported particularly easily and can be fed (after being unrolled) to the narrow side surface of the pressed body.

According to the method according to the invention, a material strip comprising one or more layers of resin-impregnated paper can be provided as an edge strip. In particular, the layer or the layers in the material strip are kraft paper, a type of paper with the maximum possible strength. Kraft paper is made almost 100 % of cellulose fibres, only starch, alum and glue being added to achieve surface effects and increases in strength. Long-fibre softwoods, for example spruce or pine, are particularly well suited as a raw material (source: http://de.wikipedia.org/wiki/kraftpapier). As a material for the edge strip, ABS (acrylonitrile butadiene styrene), PP (polypropylene), PVC (polyvinyl chloride) and/or melamine can also be used. It is also conceivable to provide or produce the edge strip from a plurality of the previously described materials. An edge strip made of such a material can be joined particularly well with the narrow surface of the pressed body, especially under raised pressure (contact pressure) and/or at raised

temperature, and is also relatively insensitive with respect to further processing steps of the lignocellulose-containing sheet-type material, in particular in the edge region. In other words, a lignocellulose-containing sheet-type material can be fed without further action to an edge processing operation, without the risk thereby arising of the edge strip and therefore the carrier for the optical code becoming unusable.

The edge strip can also be provided with laser-selective additives (particles), in particular laser-selective pigments. Laser-selective means that the additive or the pigments, when the laser beam (the laser light) strikes them, convert the laser light into heat, as result of which the temperature of the additive or the pigments increases abruptly. The consequence is that the colour of the immediate vicinity of the particles of the additive or the pigments changes permanently (source: http://magazin.merck.de/de/life_and_quality/functionelle pigmente/lazerflair1.html). A corresponding laser-selective additive can be provided as a pigment or granulate or can be introduced into the material of the edge strip. In principle, it is also possible for the laser-selective additive itself to change colour as soon as the additive particles are hit by the laser light; in this case, the material (the matrix) into which the particles of the additive are embedded does not in itself have to be capable of changing colour due to a laser light. Such an embodiment of the edge strip is particularly advantageous when, according to an embodiment of the method according to the invention, the optical code is printed by means of a laser printing

method, such as will be mentioned below. Through the selection of the particles which form the laser-selective additive, the marking time (printing time) and the colour of the printed code can also be adjusted.

As already mentioned above, the edge strip has, according to the invention, a roughness which is less than that of the narrow side surface of the pressed body. According to a further embodiment of the method, provision is made such that the roughness according to Bendtsen amounts to at most 450 ml/min, preferably at most 200 ml/min, particularly preferably at most 100 ml/min, and/or the roughness according to Parker Print Surf (PPS) amounts to at most 10 µm, preferably at most 5 µm, particularly preferably at most 2 µm, and/or the roughness according to Bekk amounts to at least 10 s, preferably at least 50 s, particularly preferably at least 100 s.

The roughness is a term from surface physics, which denotes the unevenness of the surface level (the depressions forming the unevenness are filled or levelled out by the material of the edge strip, in particular when the edge strip is pressed onto the narrow surface under raised pressure). Various measurement methods are known for determining the roughness. The so-called roughness according to Bendtsen denotes the value for the rate of the air flow which passes between a measuring ring of a measuring head and the sample surface and which arises with a fixed excess pressure. The air volume flowing out per minute is obtained as a result. The so-called roughness according to Parker Print Surf (PPS roughness) is also determined by an air flow measuring method, wherein an air flow is ascertained between an annular

measuring body and the sample, which lies on a hard rubber sheet. In the measurement method according to Bekk, the sample is pressed on a glass ring with a rubberised stamp and the elapsed time is measured that a defined air volume requires to pass through the gap between the sample surface and the glass plate. The space beneath the glass ring is acted upon by a vacuum. The value thus ascertained is the so-called roughness according to Bekk. All the methods provide a measure for the smoothness or roughness of the surface of a workpiece, for example an edge strip (sources: M. Lechthaler, W. Bauer, "Rauigkeit und Topografie - Ein Vergleich unterschiedlicher Messverfahren", http://de.wikipedia.org/wiki/rauheit).

With the previously defined values for the roughness of the surface of the edge strip, a particularly good quality of the print, i.e. of the printed optical code, is obtained. The latter can be printed in particularly high resolution, which enables a high density of data per unit area to be achieved.

According to another embodiment of the method according to the invention, the edge strip is applied only on a part of the narrow side surface. Thus, it is also conceivable for the edge strip not to cover the entire narrow side surface of the pressed body. It is also conceivable for the edge strip to be provided only in a region which, in a subsequent processing step, is not subjected to any processing or at least no processing influencing the edge strip and/or the optical code. In principle, however, it would also be conceivable to arrange the edge strip precisely in a region which is

processed in a processing step, in particular the last processing step, in such a way that the edge strip or at the least the optical code is removed or covered; in this case, the optical code serves in particular to display data which relate to and/or identify the lignocellulose-containing sheet-type material up to the processing step through which the optical code is removed or covered. In the latter case, the optical code would then subsequently no longer be visible, which may be desired, amongst other things for optical reasons, for example when the lignocellulose-containing sheet-type material is to arrive at the end consumer as part of a piece of furniture.

An edge strip, such as can be provided according to the invention, can preferably be fitted to both longitudinal edges of the sheet-type pressed body and be printed with be said optical code. In the case of the pressed body, the principal surfaces whereof are rectangular, longitudinal edges are intended to mean the two longer narrow surfaces. If an optical code, in particular the same optical code, is present on both longitudinal edges of the pressed body, it is ensured that a sheet stack comprising a plurality of sheets (sheet-type materials) produced by the method according to the invention or an individual sheet (sheet-type material) produced by the method according to the invention can always be identified from a side from which the sheet stack or the sheet has been taken up or set down by a stacker truck. The optical code can be provided at a point of the edge strip or the longitudinal edges which can be detected from the position of the stacker driver by means of a manually operated reading device or automatically by a

reading device fixed to the stacker truck. Internal flows of goods can thus be detected very easily.

According to another embodiment of the method according to the invention, the edge strip is applied with a length which corresponds at most to 150 %, preferably at most 125 %, particularly preferably at most 110 % of the length of the optical code. In addition or alternatively, it is also conceivable for the edge strip to be applied with a width which corresponds at most to 150 %, preferably at most 125 %, particularly preferably at most 110 % of the width of the optical code. The length or width of the optical code is defined as the distance between the points farthest removed from one another in the given dimension (length, width) and which are still part of the code. The area for the application of the optical code can thus be reduced to a minimum. It is preferable if an edge still remains between the outer points of the optical code and the edge of the edge strip, as a result of which any damage to the edge of the edge strip cannot lead to illegibility of the code.

In particular, the optical code can be supplemented by a further code segment once or repeatedly, each time after a time interval, in particular each time after a processing step of the pressed body. It is thus conceivable that, after the production of the pressed body, i.e. after the pressing, a first code segment can be printed on the edge strip which contains data for subsequent processing steps or intended uses. After a processing step, a further code segment can then be added on the edge strip which contains data concerning the processing step that has just taken place or concerning a

subsequent processing step. Each code segment preferably already forms in itself a complete optical code according to the preceding and following description.

According to the method according to the invention, the optical code corresponds to data or datasets which are stored in a data processing system and which relate to and in particular identify the lignocellulose-containing sheet-type material. In other words, a corresponding dataset is saved or stored in a, in particular stationary, memory (storage medium) in respect of each code and/or code segment. This dataset or these data can also be supplemented with each further supplemented code segment, i.e. further data are stored in the memory.

It is however also conceivable for a stored dataset corresponding to a printed optical code or code segment also to be extended at time intervals without supplementing (printing) a further code segment; thus, for example, after a processing step of the lignocellulose-containing sheet-type material that has taken place, it is possible, instead of applying a further code segment, simply to extend the dataset in the memory, for example by data relating to or identifying the processing step of the lignocellulose-containing sheet-type material that has just taken place or a subsequent processing step.

It should again be pointed out that data corresponding to the code does not necessarily have to be provided in a memory. Depending on the embodiment of the code or the code segment on the sheet edge, the data can also to be contained at least partially directly in the code, which

enables an automatic material identification for the subsequent processor. It is also conceivable for a customer-specific code to be provided on the sheet edge, said code providing the customer with his necessary information in encoded form. That is to say that standardised data such as product data are provided in a code on a (stationary) storage medium. Customer-specific data (such as for example material number of the customer) for automatic identification before the further processing process can, if the customer so wishes, be made available in a further code.

According to another embodiment of the method according to the invention, the optical code is applied on the edge strip by means of a contactless printing process, in particular by means of an inkjet or laser printing process. In the case of a laser printing process, the material or a component of the material of the edge strip, in particular the particles of a laser-selective additive, is coloured by contact with the laser light or laser beam. For the laser printing process, use is made in particular of a CO_2 laser and for the inkjet printing process use is made in particular of an inkjet printer. During a printing process, in particular an inkjet printing process, or thereafter, provision can also be made to dry the region of the edge strip that has just been printed, in order to prevent smearing of the optical code or the latter being made unidentifiable. This can be carried out by a suitable drying device. In principle, it is also conceivable to apply the optical code by means of a printing element making contact with the edge strip, in particular by means of a stamp, for example a roll stamp.

According to another embodiment of the method according to the invention, a code containing at least one two-dimensional (2D) and/or three-dimensional (3D) code, in particular at least one matrix code, preferably a data matrix code, is printed as the optical code. Individual code segments of the whole optical code can also form different types of code (1D, 2D, 3D); one code segment is for example a two-dimensional code and another code segment for example a three-dimensional code.

A 2D code can be a stacked barcode (an individual barcode would be a 1D code), i.e. linking of individual barcodes which are arranged vertically one below the other. A check digit for the whole code arrangement guarantees the data security of the 2D code. The term 2D code can be derived from the two-dimensional representation of information. This means that the standard barcode would be a 1D barcode, since the code information is represented only in the X axis. In the case of the stacked codes, a second information level is added in the form of the Y axis. By means of this kind of compression, i.e. stacking, the area for a 2D code can be kept relatively small. The use of the reading technique is associated, in comparison with standard barcodes, with only a small additional cost, which proves beneficial in practice, inasmuch as the code structures of standard barcodes are retained. In parallel with this, a series of codes has been developed which can no longer be referred to as barcodes, but so-called matrix codes. The maxi code was originally developed especially for the tasks of omnidirectional parcel sorting, in order to be able to sort quickly and reliably ("omnidirectional code": code detectable from all directions). A self-correcting error

correction algorithm guarantees the data security. Rapid image processing systems in the form of line-scan cameras or matrix cameras are however required as a basis for the reading side. Another route is taken with the data matrix code which is preferred in the present invention. This code is useful chiefly in the area of a small space requirement. The code permits the omnidirectional readability by analogy with the maxi code. The data matrix code is very compact, secure and permits a large number of different symbols and textsets in the encoding. A further two-dimensional code is the so-called QR code. A 3D code is finally a code which contains for example different colours as an additional information level; for example, a 2D matrix code with different colours is a 3D code. The more levels (dimensions) the code has, the more data can be linked to the latter and the smaller the code can be with the same information content.

The previously described codes can be read in a straightforward manner in the production process with cameras and reading devices suitable for industry, which also gives the further processor of the produced lignocellulose-containing sheet-type material the possibility of identifying automatically, at the start of the production process of the further processor, the raw material used, i.e. the lignocellulose-containing sheet-type material produced by the method according to the invention or the underlying pressed body.

According to a further embodiment of the method according to the invention, the optical code, i.e. also the given code segment in the case where a plurality of code segments are provided, is read by a reading device, for

example is detected by a reading device integrated into a smartphone or other Internet-enabled device, and transmitted to the data processing system. It is conceivable, after and/or before each processing step of the lignocellulose-containing sheet-type material, for a reading device to be installed which detects the previously printed code and transmits it to the data processing system, which then in turn carries out in particular a control of the device or the processing stations of the device on the basis of the data corresponding to the code saved (i.e. stored) in the memory, in order to perform the given further processing step. The reading device can transmit the dataset corresponding to the optical code or the corresponding stored data to a display device, which can also be integrated into a smartphone or other Internet-enabled device, which in turn displays or reproduces the received data, for example as plain text, graphics (image) or video. The reading device or another reading device that detects the optical code can also transmit the detected data to a device for checking the print quality, which can be part of the data processing system, wherein the device is configured in such a way that it compares the data received from the reading device concerning the print quality with stored setpoint values for the print quality and/or with a stored dataset for an optical code and, in the case of a deviation from the setpoint values for the print quality or the ascertainment of non-compliance (deviation) with the stored dataset for the optical code, causes a display device, in particular the previously defined display device, to display information concerning an inadequate print quality. In other words, a

reading device can be used to inform the operative about deviations from an optimum print quality.

According to another embodiment of the method according to the invention, a sheet-type body with a thickness (distance between top and bottom principal surface) of at least 5 mm, preferably at least 8 mm, particularly preferably at least 10 mm, is produced as a pressed body by pressing. It has been shown that a pressed sheet with such a thickness on the one hand can be printed particularly well at the side, since the narrow surface and therefore the subsequent printing surface formed by the edge strip is particularly flat. On the other hand, a pressed sheet having such a thickness can be provided with an optical code with relatively large dimensions and a correspondingly large amount of data. Finally, a pressed sheet with such a thickness can also be provided with the mentioned edge strip in a particularly favourable and durable manner.

According to yet another embodiment of the method according to the invention, wood chips, wood strands and/or wood fibres, which are provided with a binder, are predominantly or exclusively used as lignocellulose-containing material during the pressing. In particular, the step of pressing or producing the pressed body is thus carried out in such a way that the proportion of the lignocellulose-containing material has the previously defined values. The proportion of the lignocellulose-containing material in the pressed body amounts in particular to at least 50 vol. %, preferably at least 75 vol. %, particularly preferably at least 90 vol. %.

According to another embodiment of the method according to the invention, provision is made such that the application of the edge strip on the pressed body takes place before or after a coating of at least one of the principal surfaces of the pressed body. In other words, the pressed body can also be or become provided with a coating, which however does not have any influence on the application of an edge strip for receiving an optical code.

Finally, according to yet another embodiment of the method according to the invention, provision is made such that, after the application of the edge strip on the pressed body, a part of the pressed body provided with the edge strip is severed at a severing location, as a result of which the pressed body acquires a new narrow surface at the severing location, wherein the new narrow surface of the pressed body is in particular coated. In other words, the edge strip is removed at least partially, preferably completely, by the severing process and the narrow surface (cut surface) newly arising on the sheet-type pressed body is then provided with a coating, for example with a lacquer or a plastic such as ABS, PP, PVC or melamine. Thus, it is in particular conceivable for the edge strip or the printed optical code to be used for a sheet-type pressed body with a "raw format", i.e. for the sheet before it is severed for example into individual furniture parts, panels or generally individual workpieces (which then form the given lignocelluloses-containing sheet-type material). Provision can be made such that the edge strip or the print falls away as an offcut after the splitting-up of the sheet-type pressed body with a raw format.

Raw format is understood to mean the pressed sheet as it comes out of the pressing device, possibly after the edge working or sawing (which however does not significantly change the format) or after a severing cut, in order to create an easily manageable raw format (also referred to as a "half-size format"). Pressed sheets after the coating are usually brought into such a special raw format, i.e. said half-size format. In the following, a format example: sheet after extraction from the pressing device 5,60 x 2,07 m -> coating -> severing cut -> 2,80 x 2,07 m (coated half-size format).

Each pressed sheet is preferably provided with two of the described optical codes after the pressing device, wherein each part has a code after the splitting-up into the half-size formats. Alternatively, it is possible for each half-size format to be provided separately with an edge strip and an optical code only after the coating and splitting-up. Or an edge strip is applied in the middle, provided twice with an optical code and then severed in the region of the edge strip between the two printed codes.

According to a second teaching of the present invention, the problem is also solved by a device according to claim 13.

As a pressing device, use can be made for example of a press operating continuously or in cycles, into which one or more loose (i.e. not yet compressed) layers of lignocellulose material, in particular wood-based material, are introduced, wherein the lignocellulose

material is provided with a binder. The already described sheet-type pressed body thus arises as a result of pressing at raised temperature and under raised pressure.

The edging device can be provided with a supply of material in roll form (as mentioned, the edge strip can be made available as a material in roll form) and/or with one or more pressure rollers for pressing the edge strip against the narrow side surface of the pressed body. A heating device can also be provided, which heats the edge strip and/or activates or liquefies an adhesive applied thereon.

The printing device is in particular connected to the already mentioned or a separate data processing system, which transmits the optical code to be printed to the printing device. The printing device can comprise a plurality of printing heads, which can be arranged at different points of the device for producing the lignocellulose-containing sheet-type material. A corresponding optical code or code segment can thus be printed on the edge strip after or before specific processing steps. In particular, the printing device is disposed downstream of the edging device.

In addition, the device according to the invention can comprise a reading device which is configured for detecting the optical code and transmitting the optical code to the data processing system, and/or a display device which is configured for displaying received data relating to or identifying the lignocellulose-containing sheet-type material.

As mentioned, the device can also comprise a drying device, which is configured in such a way that ink or dye previously printed on the edge strip is dried.

Finally, according to a third teaching of the present invention, the problem is solved by the use of a lignocellulose-containing sheet-type material according to claim 15.

Data relating to the sheet-type material and in particular identifying the latter are understood to mean, amongst other things, individual data or a plurality of data which are selected from the group comprising data concerning the properties of the sheet-type pressed body and/or material, data concerning the quality of the sheet-type pressed body and/or material, data concerning the processing steps of the sheet-type pressed body and/or material that have been carried out or are due to be carried out, data concerning the processing location of the sheet-type pressed body and/or material, data concerning the processing time (date and/or time and/or duration) of the sheet-type pressed body and/or material, data concerning the processor of the sheet-type pressed body and/or material, data concerning the intended use of the sheet-type pressed body and/or material, data concerning legally required markings of the sheet-type pressed body and/or material, for example the CE mark or timber certification or timber origin marks (PEFC, FSC).

The method according to the invention, the device according to the invention and the use according to the invention of a lignocellulose-containing sheet-type

material are characterised, amongst other things, as follows.

1. Traceability

Once a pressed sheet has left the press, it is no longer readily possible to trace the production parameters that were present with the pressed plate. This also applies to processing steps downstream of the pressing, such as profiling, grinding and coating. In the prior art, data which describe the production parameters and the mentioned processing steps are passed on with the aid of so-called packing slips. If however a sheet pack (a stack of a plurality of the individual sheets arranged upon one another in two-dimensional contact) is further processed, for example by coating of the individual sheets, this pack then first has to be split up or isolated into single units and the data relating to this pack are lost, especially when the processed pressed sheets are then allocated to different orders and stored individually. By means of the optically detectable code provided on each lignocellulose-containing sheet-type material, the invention permits the corresponding data to be read out at any time on the respective sheet via the data processing system or to be read off directly from the edge strip, so that it is at all times possible to identify the production parameters and processing steps that were previously present or were previously carried out.

2. Control of the logistics chain

The optical code applied to the edge strip can also correspond to stored date/datasets, which can be used to control the internal logistics chain of individual sheet commissioning, production feedback, consumption posting, packing, up to the loading of the end product.

3. The information for the processor

Sheet-type materials are used for a large number of very diverse applications and must therefore meet a large number of very diverse requirements. With regard to many properties, the manufacturer is also obliged to provide corresponding verifications. These data, i.e. sheet properties, processing instructions or test certificates, etc., can also be stored and can be retrieved by the processor at any time via the optical code.

4. Quality control

Moreover, the applied optical code provides the possibility of a straightforward quality control in the event of complaints, in particular through a particularly rapid assessment of the process data from the coating process including the secondary processes.

5. Advertising space

On account of the lack of printability that has existed hitherto, the narrow surfaces of sheet-type pressed bodies according to the prior art cannot be used for effective advertising prints. The edge strip provided according to the invention is at the same time created in such a way that not only conventional characters, but

also logos and other advertising messages can be printed. By means of the optical code, the targeted consumers can be informed much more efficiently about the advantages of the present product, i.e. the lignocellulose-containing sheet-type material, for example also by retrievable promotional videos, Internet pages, images etc. stored in the memory.

A large number of possibilities exist for constituting and further developing the method according to the invention, the device according to the invention, the lignocellulose-containing sheet-type material according to the invention and the use of a lignocellulose-containing, sheet-type material according to the invention. In this regard, reference is made on the one hand to the claims subordinated to claim 1, and on the other hand to the description of examples of embodiment in connection with the drawing. In the drawing:

Fig. 1a) and b) show a diagrammatic representation of a method according to the invention,

Fig. 2 shows a plan view of an edge strip printed with an optical code and

Fig. 3 shows a device for performing the method according to the invention.

Fig. 1a) represents how, in a method for producing a lignocellulose-containing sheet-type material 1, this being a wood-based sheet 1 here, a sheet-type pressed body 2 is first produced, which comprises a top principal surface 2.1, a bottom principal surface 2.2 and at least

one narrow side surface 2.3, which connects the principal surfaces together. Pressed body 2 is produced by pressing lignocellulose-containing material 3 provided with binder, for example wood chips, wood strands and/or wood fibres, under raised pressure and at raised temperature. The production method is explained in greater detail below with the aid of fig. 3.

Fig. 1a) further represents how an edge strip 4, which here comprises by way of example two layers 4.1 of kraft paper, is applied on at least one narrow surface 2.3 of sheet-type pressed body 2. Edge strip 4 has, as can clearly be seen in fig. 1a), a roughness which is less than that of narrow surface 2.3 onto which edge strip 4 is applied.

Fig. 1a) also shows that pressed body 2 has already been provided with a coating 2.4, for example a lacquer or a film, before the application of edge strip 4.

Fig. 1b) shows lignocellulose-containing sheet-type material 1 after the application of edge strip 4 on narrow surface 2.3, wherein edge strip 4 in the representation has already been printed with an optical code 5. Code 5 has been printed on narrow surface 2.3 either before or after the application of edge strip 4, for example by means of an inkjet printer or laser printer (not represented). Optical code 5 is described in greater detail below.

Edge strip 4 has a thickness d of less than 1 mm, here for example of less than 0.5 mm. Within the meaning of the invention, therefore, thickness d means the thickness

that edge strip 4 has before its application onto narrow surface 2.3. This relatively small thickness d is however sufficient to fill and thus level out the pores and unevennesses of narrow side surface 2.3.

As fig. 1b) shows, edge strip 4 is applied over the entire narrow side surface 2.3, although it is in principle also possible to apply edge strip 4 only on a part of narrow surface 2.3.

As mentioned, edge strip 4 is provided with an optical code 5. In the example represented in fig. 1b), optical code 5 is an essentially square two-dimensional code, here a data matrix code. Fig. 2 shows an edge strip 4, which has been printed with a plurality of essentially square code segments 5.1, 5.2 and 5.3, wherein each code segment also forms alone (by itself) a complete optical code 5 within the meaning of the present invention. Each code segment 5.1, 5.2 and 5.3 is, here too, a data matrix code. Each of these codes 5 or code segments 5.1, 5.2 and 5.3 contains in encoded form data relating to the lignocellulose-containing sheet-type material and/or identifying the latter, for example data concerning processing steps that have taken place and/or are due to take place, intended uses etc.

As fig. 2 shows, edge strip 4 has a length l which is selected such that it corresponds at most to 150 % of the length of optical code 5, which here comprises a plurality of code segments 5.1, 5.2 and 5.3. As fig. 2 also shows, edge strip 4 also has a width b which is selected such that it corresponds at most to 150 % of the width of optical code 5.

Individual code segments 5.1, 5.2 and 5.3 represented in fig. 2 each contained in encoded form data concerning a particular processing step, i.e. code segments 5.1, 5.2 and 5.3 are constituted (formed) differently from one another. Individual code segments 5.1, 5.2 and 5.3 were applied at time intervals one after the other on edge strip 4, always after a specific processing step in the processing of lignocellulose-containing sheet-like material 1 had been completed.

Fig. 3 shows, with the aid of a device 9, a method for producing a lignocellulose-containing sheet-type material 1, such as has been previously described.

Lignocellulose-containing material 3, here for example wood chips, wood strands and/or wood fibres provided with binder, is first strewn onto conveyor belt 15 in one or more layers. Strewn material 3 is then fed to a continuous pressing device 10, which is configured in such a way that it compresses small-sized material 3, here wood chips, wood strands and/or wood fibres 3 glued with a binder, under raised pressure and at raised temperature to form a sheet-type pressed body 2 with a top principal surface 2.1, a bottom principal surface 2.2 and at least one narrow side surface 2.3.

Pressed sheet 2 thus arising is then fed to an edging device 11, which is configured in such a way that an edge strip 4, which here is made available as a material in roll form 6, is applied on the at least one narrow surface 2.3. Edge strip 4 is an edge strip with a

roughness which is less than that of narrow surface 2.3 of sheet-type pressed body 2.

Cellulose-containing sheet-type material 1 thus edged is then fed to a printing device 12, which is configured in such a way that it can print edge strip 4 with an optical code 5 as described above. In principle, it is also conceivable for printing device 12 to comprise a plurality of printing heads spaced apart at a distance from one another, which print edge strip 4 at time intervals at different locations with, in each case, an optical code 5 or code segment 5.1, 5.2 or 5.3.

Device 9 also comprises a data processing system 7, which contains a memory (a storage medium) 13 which is configured in such a way that it can store data relating to lignocellulose-containing sheet-type material 1.

Furthermore, device 9 comprises a reading device 8, which is configured in such a way that it can detect optical code 5 and transmit it to data processing system 7. In data processing system 7, the optical code or the signals transmitted by reading device 8 is/are assigned to a dataset stored in memory 13, wherein the data of the dataset can then be transmitted to further processing stations (not represented) of device 9, in order to carry out corresponding processing steps at these points.

The data can also be transmitted to a display device 14, which is configured in such a way that it can display the received data relating to lignocellulose-containing sheet-type material 1. The display device can also be a smartphone or other Internet-enabled device.

LIGNOCELLULÓZT TARTALMAZÓ, LEMEZ ALAKÚ ANYAG GYÁRTÁSÁRA SZOLGÁLÓ ELJÁRÁS ÉS ESZKÖZ

SZABADALMI IGÉNYPONTOK

1. Eljárás lignocellulózt tartalmazó, lemez alakú anyag (1) gyártására, amely eljárás során a következő lépéseket hajtjuk végre:

- előállítunk egy lemez alakú, préselt testet (2) felsőoldali főfelülettel (2.1), alsóoldali főfelülettel (2.2) és legalább egy oldalsó keskenyfelülettel (2.3) – kötőanyaggal (3) ellátott lignocellulózt tartalmazó anyagnak (3) nagy nyomáson és magas hőmérsékleten történő préselésével,

- elkészítünk egy legfeljebb 3 mm vastagságú (d) anyagszalagot élzáróként (4), amely egy vagy több, gyantával átitatott papírból, ABS-ből, PP-ből, PVC-ből és/vagy melaminból készült réteget (4.1) tartalmaz, amely élzáró (4) érdessége legalább az egyik oldalon kisebb, mint azé a keskenyfelületé (2.3), amelyre az élzárót (4) felvisszük,

- felvisszük az élzárót (4) – amelyre legalább 60 dpi felbontással lehet nyomtatni – a legalább egy keskenyfelület (2.3) legalább egy részére, és

- optikai kódot (5) nyomtatunk az élzáróra (4) a legalább egy keskenyfelületre (2.3) való felvitele után, amely kódot (5) legalább 60 dpi felbontásban nyomtatjuk az élzáróra (4), és amely kód egy adatfeldolgozó berendezésben (7) tárolt, a lignocellulózt tartalmazó, lemez alakú anyagra (1) vonatkozó adatoknak felel meg.

2. Az 1. igénypont szerinti eljárás, azzal jellemezve, hogy az élzárót (4) legfeljebb 2 mm, előnyös módon legfeljebb 1 mm vastagsággal (d) készítjük el.

3. Az 1. vagy a 2. igénypont szerinti eljárás, azzal jellemezve, hogy élzáróként (4) olyan anyagszalagot készítünk, amely lézerszelektív adalékot, különösen lézerszelektív színezékeket tartalmaz.

4. Az előző igénypontok egyike szerinti eljárás, azzal jellemezve, hogy a Bendtsen-érdesség legfeljebb 450 ml/perc, előnyös módon legfeljebb 200 ml/perc, különösen előnyös módon legfeljebb 100 ml/perc, és/vagy a PPS-érdesség legfeljebb 10 µm, előnyös módon legfeljebb 5 µm, különösen előnyös módon legfeljebb 2 µm, és/vagy a Bekk-simaság legalább 10 s, előnyös módon legalább 50 s, különösen előnyös módon legalább 100 s.

5. Az előző igénypontok egyike szerinti eljárás, azzal jellemezve, hogy az optikai kódot (5) egyszer vagy több alkalommal egy-egy időköz után, különösen a préselt test (2) egy-egy megmunkálási lépése után kiegészítjük egy további kódszakasszal (5.2) (5.3).

6. Az előző igénypontok egyike szerinti eljárás, azzal jellemezve, hogy az optikai kódot (5) az élzáróra (4) érintésmentes nyomtatási eljárással, különösen tintasugaras vagy lézernyomtatási eljárással visszük fel, és/vagy egy olvasókészülékkel (8) érzékeljük, és az adatfeldolgozó berendezéshez (7) juttatjuk.

7. Az előző igénypontok egyike szerinti eljárás, azzal jellemezve, hogy optikai kódként olyan kódot nyomtatunk, amely legalább egy kétdimenziós és/vagy háromdimenziós kódot, különösen legalább egy mátrixkódot, előnyös módon adatmátrix-kódot tartalmaz.

8. Az előző igénypontok egyike szerinti eljárás, azzal jellemezve, hogy préselt testként (2) a préseléssel olyan lemez alakú testet (2) állítunk elő, amelynek vastagsága (D) legalább 5 mm, előnyös módon legalább 8 mm, különösen előnyös módon legalább 10 mm.

9. Az előző igénypontok egyike szerinti eljárás, azzal jellemezve, hogy a préselésnél lignocellulózt tartalmazó anyagként (3) faforgácsot, hántolási forgácsot és/vagy farostot használunk.

10. Az előző igénypontok egyike szerinti eljárás, azzal jellemezve, hogy a lignocellulózt tartalmazó anyag (3) részhányada a préselt testben (2) legalább 50 térfogat%, előnyös módon legalább 75 térfogat%, különösen előnyös módon legalább 90 térfogat%.

11. Az előző igénypontok egyike szerinti eljárás, azzal jellemezve, hogy az élzárót (4) a préselt test (2) legalább egyik főfelületének (2.1, 2.2) a rétegezése előtt vagy után visszük fel a préselt testre (2).

12. Az előző igénypontok egyike szerinti eljárás, azzal jellemezve, hogy az élzárónak (4) a préselt testre (2) való felvitele után egy leválasztó helyen leválasztjuk a préselt testnek (2) egy, az élzáróval (4) ellátott részét, miáltal a préselt test (2) a leválasztó helyen új keskenyfelületet nyer, és a préselt testnek (2) ezt az új keskenyfelületét különösen rétegezzük.

13. Eszköz (9) lignocellulózt tartalmazó, lemez alakú anyag (1) gyártásához, különösen az előző igénypontok egyike szerinti eljárás kivitelezéséhez,

- egy présberendezéssel (10), amely arra van kialakítva, hogy kis darabokból álló anyagot nagy nyomáson és magas hőmérsékleten préseljen, és előállítson egy felsőoldali főfelülettel (2.1), alsóoldali főfelülettel (2.2) és legalább egy oldalsó keskenyfelülettel (2.3) rendelkező préselt lemezt (2),

- egy élkészítő berendezéssel (11), amely arra van kialakítva, hogy egy legfeljebb 3 mm vastagságú (d) élzárót (4) felvigyen a legalább egy keskenyfelületre (2.3), amely élzáróra legalább 60 dpi felbontással lehet nyomtatni, és amely élzárót egy olyan anyagszalag képezi, amely egy vagy több, gyantával átitatott papírból, ABS-ből, PP-ből, PVC-ből és/vagy melaminból készült réteget (4.1) tartalmaz, továbbá az élzáró (4)

érdessége legalább az egyik oldalon kisebb, mint azé a keskenyfelületé (2.3), amelyre az élzáró (4) felvitelre kerül,

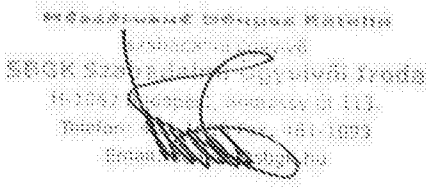
- egy nyomtató berendezéssel (12), amely arra van kialakítva, hogy legalább 60 dpi felbontásban egy optikai kódot (5) nyomtasson a felvitt élzáróra (4), és

- egy adatfeldolgozó berendezéssel (7), amelynek van egy memóriája (13), amely arra van kialakítva, hogy tárolja a lignocellulózt tartalmazó, lemez alakú anyagra (1) vonatkozó adatokat.

14. A 13. igénypont szerinti eszköz (9), azzal jellemezve, hogy az eszköznek (9) van egy lézerkészüléke (8), amely arra van kialakítva, hogy az optikai kódot (5) érzékelje, és az optikai kódot (5) az adatfeldolgozó berendezéshez (7) juttassa, és/vagy egy kijelző készüléke (14), amely arra van kialakítva, hogy a lignocellulózt tartalmazó, lemez alakú anyagra (1) vonatkozó, kapott adatokat kijelezze.

15. Az 1-12. igénypontok egyike szerinti eljárással gyártott, lignocellulózt tartalmazó, lemez alakú anyag (1) alkalmazása, amely anyagnak van egy lemez alakú, préselt teste (2) felsőoldali főfelülettel (2.1), alsóoldali főfelülettel (2.2) és legalább egy oldalsó keskenyfelülettel (2.3), valamint egy, a legalább egy keskenyfelületre (2.3) felvitt élzárója (4), amelyre legalább 60 dpi felbontásban egy optikai kód (5) van nyomtatva a lignocellulózt tartalmazó, lemez alakú anyagra (1) vonatkozó adatok feldolgozásához.

(A meghatalmazott)



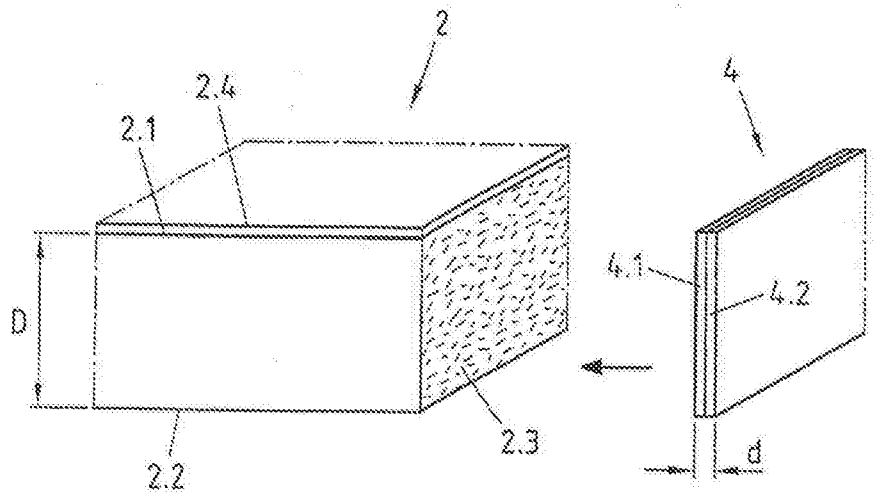


Fig.1a

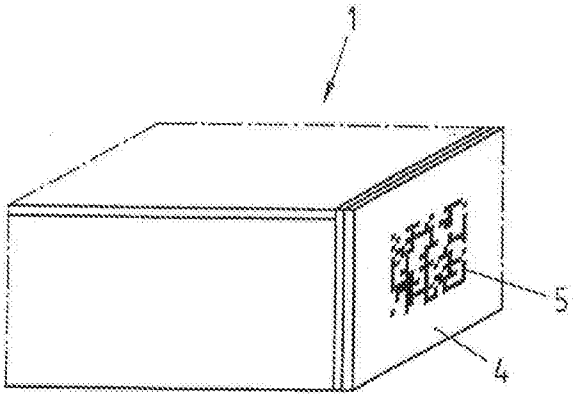


Fig.1b

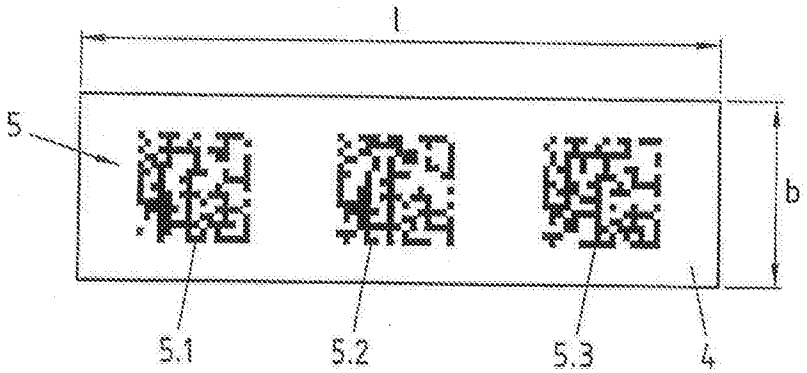


Fig.2

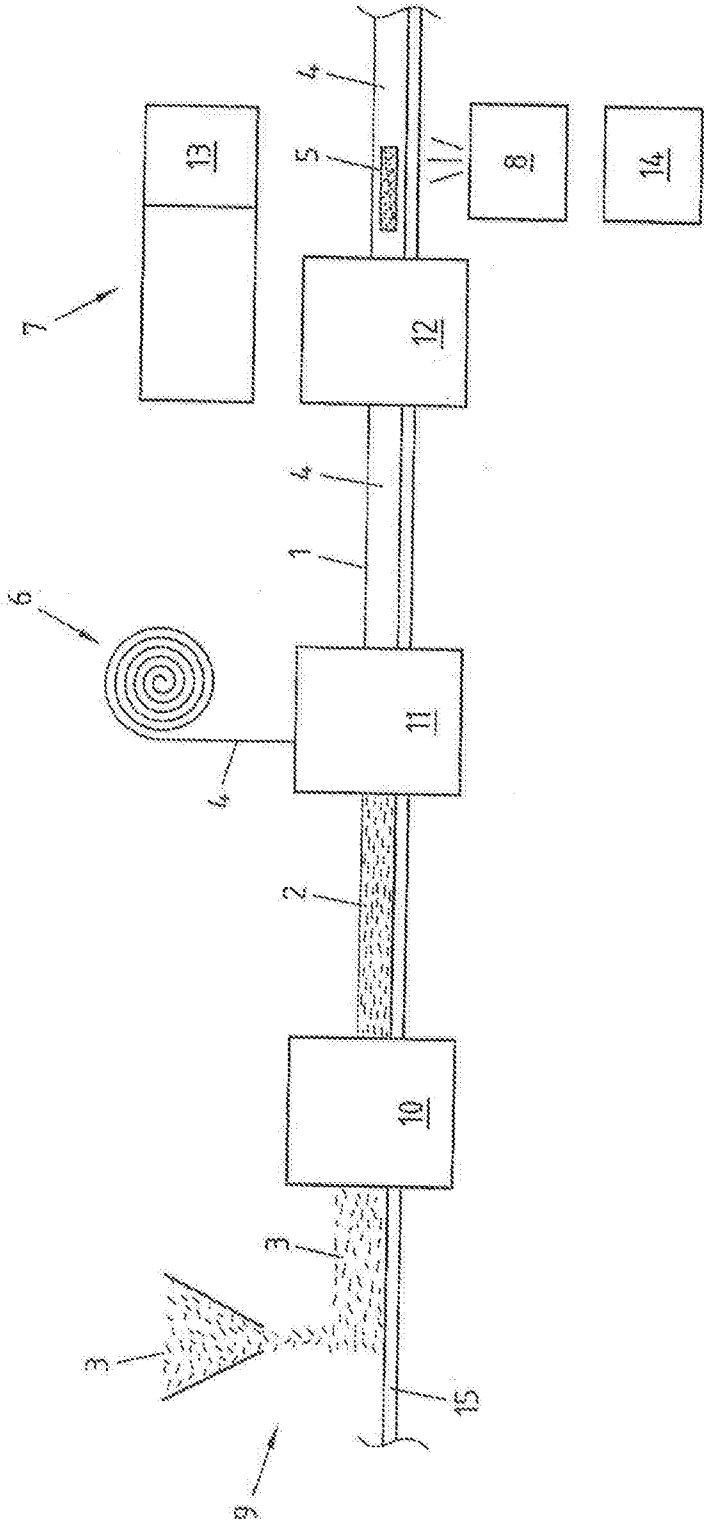


Fig.3