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(54) **A method for supplying a liquid to a mat of wood particles to be pressed to boards, and a device for carrying out the method.**

(57) A method for supplying a liquid to a mat (11) of wood particles to be pressed to boards and a device for carrying out the method. Finely divided liquid, e.g. water or a wax dispersion, is supplied to the mat (11) synchronous with the deposition of wood particles from the forming station (10). The same amount of liquid per unit of surface of the mat will be supplied as the liquid is fed to the mat (11) synchronous with the deposition of wood particles from the forming station (10). A device for carrying out the process comprises a forming station (10), equipped with nozzles (17a, 17b) for liquid and outlet means, which are arranged in such a manner, that liquid will be fed from the nozzles (17a, 17b) simultaneously with the operation of the forming station (10).

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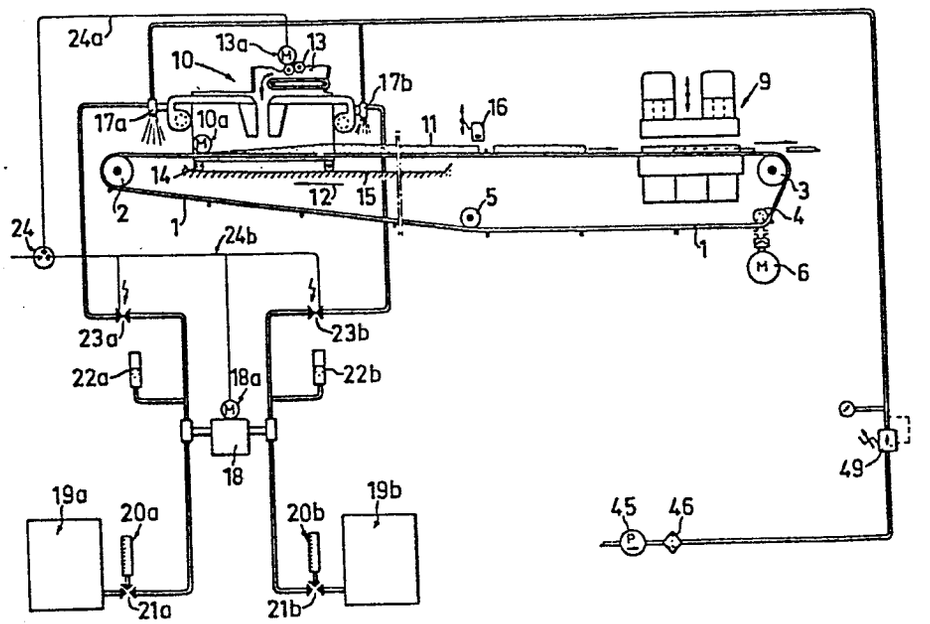
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A METHOD FOR SUPPLYING A LIQUID TO A MAT OF WOOD PARTICLES TO BE PRESSED TO BOARDS, AND A DEVICE FOR CARRYING OUT THE METHOD.

The present invention relates to a method at feeding a liquid to a mat of wood particles and the like, where the liquid is fed in connection with the operation of the forming station for depositing the wood particles to form a mat. The invention further relates to a device for carrying out the process.

At the production of board materials from wood particles and the like, e.g. particle boards, chips and/or small fibre form components, based on cellulose, are glued with curable glues and are made into a particle mat by means of a forming station on a mat carrier. The mat carrier can consist of a continuous conveyor or of separate press platens, which platens are transported on a continuous conveyor. The formed mat of particles is then passed into a heating press, optionally after having passed a device for splitting the particle mat into sections to be pressed. The press can be of the single-opening kind, the multiple-opening kind or it can be continuous. The glue in the glued particles will be cured under the influence of the heat and pressure in the press and a board material is obtained.

In order to obtain reproducible results during the curing process, it is essential that the particles have a certain moisture content. The moisture content can be adjusted with respect to the used glue and generally it does not exceed 14 per cent by weight. At the heat treatment in the press a steam jet effect is produced and this shortens the press time. If the moisture content is too high, this steam jet can cause delamination of the pressed particle material.

The most satisfactory results are obtained, if the uniformly moistened particles before the pressing are sprayed, on the top-side and/or the under-side, with water or a water dispersion, containing surface modifying additives, such as release agents or hydrophobing agents.

Previously known methods for applying a liquid are based on the principle, that the liquid is distributed during the transport of the particle mat into the press. At

a constant flow of liquid the amount of liquid per surface unit of the particle mat will be dependent on the speed, at which the mat is conveyed. A process of this kind is described in the British Patent 1 344 049. Variations of the speed will cause the amount of liquid per surface area to vary. Too much liquid on the top-side and/or under-side of the mat will be obtained, e.g. at start or stop of the mat conveyor, due to the acceleration and retardation, respectively, of this. This will lead to non-uniform curing during the pressing, as the steam jet effect varies with the moisture content of the heated material. Furthermore, the condition of the surfaces of the produced boards will vary as a result of the non-uniform addition, if the applied liquid contains surface modifying additives.

Several attempts have been made to overcome these disadvantages. Thus the Swedish Patent 398 075 discloses a device, where the speed of the mat conveyor is registered and the liquid addition is adjusted with respect thereto.

According to the present invention , the problem of obtaining a uniform distribution of the liquid on the top-side and/or under-side of the particle mat has been solved by fitting means for liquid outlet in fixed connection to the forming station and by making the liquid addition synchronous with the operation of the forming station.

The invention is applicable to any forming station for particle or fibre material, when it is desired to spray the mat with a liquid. Important fields of application are the production of fibre boards and especially particle boards. The forming stations can be of several different kinds. At the production of fibre boards sheets are often formed on a wire from a suspension and the liquid is then added primarily to supply surface modifying additives. The material can also be deposited dry or with admixed glue or other additives only. The material can then be deposited over a certain length of the mat, directly on this, usually in the form of several layers of different qualities, or over a greater length of the mat by whirling the material and depositing this in a special chamber equipped with fans.

The invention will below be described primarily for the production of particle boards from dry or merely moistened particles by deposition on a conveyor, which constitutes the most important field of application of the present invention.

The forming station for the production of a particle mat, which station can be rigidly installed or be movably installed, connected with the mat conveyor, is adapted to give a uniformly deposited mat at any operation conditions, and great demands are made on the accuracy of this apparatus as a particle mat, which has not been uniformly deposited, does not give acceptable finished board materials. For example, for a movably installed forming station, which moves from one terminal position to an end position during simultaneous deposition of particles, and subsequently returns to the terminal position without particle deposition, the forming station is run by a driving motor, while the particle deposition is achieved by a separate motor. During the period of particle deposition the amount of deposited particles must be constant, at the same time as the driving motor must run the forming station at a constant speed. The least deviation from the predetermined operating conditions will inevitably bring about variations in the thickness of the deposited particle mat and this will in its turn result in a non-uniform weight by unit of volume of the particle bed during the subsequent pressing, which might lead to cassation.

By the arrangement of liquid outlet means in fixed connection with the forming station, according to the present invention, these means will move at the same speed as the forming station, which, as has been mentioned above, must move at a constant speed, in order that a uniform particle mat will be obtained. As the addition of the liquid is synchronous with the operation of the forming station, a uniform addition of liquid over the entire particle mat will be attained. A uniform liquid distribution on the entire top-side and/or under-side of the particle mat is thus obtained hereby, and this distribution is

completely independent of the non-uniform speed of the mat conveyor at start and stop.

According to a preferred embodiment the operation of the liquid addition equipment is started synchronously with the motor for particle deposition in the forming station, since liquid is to be added only during the period of particle deposition and not during the return of the forming station to the terminal position. It is, however, within the scope of the invention, that the liquid addition equipment is started synchronously with the driving motor for the forming station, provided that suitable switching means are provided, which means ensure, that no addition is obtained at the return of the forming station to the terminal position.

The definition, that the means for liquid feeding are to be arranged in fixed connection to the forming station, implies, according to the invention, that there must not be any essential time delay of the movement of the forming station with respect to the movement of the outlet devices, which means, that these devices might be placed at a distance from the forming station, if required. It is, however, preferred that the means for supplying liquid are fixedly fitted on the forming station. In some cases the mat conveyor is also moved during deposition when the forming station is movably arranged and this is within the scope of the invention. In those cases the forming station is fixedly mounted and the particles are deposited on a continuously run mat conveyor, the liquid supply means can be mounted fixedly above the mat conveyor and at an arbitrary distance from the forming station. The greatest advantages of the present invention are, however, obtained when the employed forming station is movable.

At the present method the liquid is usually added, finely divided by means of spray nozzles. The liquid can in a known manner contain other additives, commonly used at board production, such as surface modifying agents, e.g. wax dispersions, gloss agents, anti-tack agents, agents for regulation of the curing of the glued particles or formal-

dehyde absorbing agents. The liquid can according to the invention be supplied to the top-side and/or the underside of the particle mat depending on the fact, whether the liquid supply means have been arranged on either and/or both of the sides of the forming station, which are turned towards the mat conveyer.

The position of the nozzles with respect to the forming station is not critical at the deposition of continuous mats, as long as their relative movement with respect to the mat is uniform with that of the station. For practical reasons and from considerations of space, it is suitable to place the nozzles as near as possible to the place of particle deposition. However, the particle deposition device often has a relatively great extension in the longitudinal direction of the bed, particularly when the particles are whirled before the deposition, and if it in this case is desired to spray the surface or the surfaces of the bed, the nozzles must be placed outside the area for particle deposition and thus at a considerable distance from the centre of the particle supply. At the relative movement of the forming station over the mat, the nozzles for spraying the bed conveyor, the means for particle deposition and the nozzles for spraying the top-side of the bed, respectively, will sweep over different sections of the mat. After the return and at repeated relative movement over the mat, the particle deposition as well as the spraying will, however, continue, where they were previously interrupted, so that a continuous distribution of both particles and liquid will be obtained along the path. Both the particle deposition and the spraying are generally satisfactorily tuned and no seams of any consequences for the final quality of the board will be caused. If the bed, prior to the pressing, is divided into sections by forming a space devoid of particles between the boards to be produced, this splitting can thus normally be made independent of the seams between the deposition and spraying sections and the seam, resulting from the particle deposition, will generally be present

somewhere near the middle of the surface of the produced board. Should there be problems to obtain a uniform liquid distribution at the seam for the liquid spraying between the movements to and fro, or if the demands on uniformity are particularly great, the conditions can with advantage be adapted in such a manner, that the intervening spaces between the board sections are formed by removal of material at the spraying seams

The liquid outlet means can be known devices for feeding liquids, e.g. nozzles or spray nozzles, and should have several atomizing nozzles or spray nozzles, the number being adapted to the width of the particle mat, the spraying angle and the height of the device to the mat. The positioning is intended to give a uniform distribution of the liquid over the width of the mat, which can be difficult with respect to the fact, that the amount of applied liquid often is rather small. The spray areas covered by the nozzles should be adjusted to partial overlapping. According to a particularly preferred embodiment, nozzles which give oval spraying patterns, are used and the major axis of the ovals are oriented across the longitudinal direction of the bed, in order that the overlapping can be enlarged without increasing the spray jets in the longitudinal direction of the bed. The extension of the spray pattern in the longitudinal direction of the bed is set by the fact, that it must not be so great, that a uniform distribution over the surface cannot be obtained and not so small, that minor variations in the relative movement between the bed and the nozzles, particularly in the seams between the different applying sections, will give rise to great variations in the sprayed amount. A suitable extension of the spray patterns of the nozzles in the longitudinal direction of the bed is between 5 and 50 cm and preferably between 10 and 30 cm.

The liquid can be supplied by means of compressed air via a dosage pump or other known dosage equipment, comprising pressure equalizing vessels and magnetic valves. The dosage pump should, in order to obtain the most uniform distribution,

be of that kind, which gives a fairly constant volume feed, independent of the back pressure, and can e.g. be a diaphragm pump. Special pressure equalizing vessels are sometimes superfluous, e.g. if the conduit systems have such a flexibility, that a certain volume of liquid under pressure can be contained therein. Magnetic valves are preferred, as they give a rapid response to opening and closing impulses. They should be placed as near the nozzles as possible to obtain the fastest response. The dosage means and optional magnetic valves are suitable electrically operated , in such a manner that they work simultaneously with the particle deposition from the forming apparatus. Normally the particle deposition is started a second or so before the relative motion between the forming station and the bed is commenced in order to eliminate the effects of dead-time, and it has often been found suitable to start the nozzles at the same time as the particle deposition. Adjustment and selection of start and stop points must, however, be made individually for each installation.

The invention also relates to a device for carrying out the above described process, said device comprising a movable forming station, which at least on one side is provided with liquid supply means, whereby the driving device of the latter is connected for synchronous operation with the forming station. According to a preferred embodiment, both of the sides of the forming station, which are turned towards the particle mat, are provided with liquid supply means, preferably nozzles or spray nozzles. The spray nozzles on each side of the forming station are run by a dosage pump via a magnetic valve on the respective feed pipe and the pump and the magnetic valves are connected for simultaneous operation with the driving device of the forming station for the deposition of particles. Preferably a double dosage pump is used and each half of the pump feeds the outlet means on the respective side.

The invention is below described schematically with reference to the accompanying drawing. The description is, however, not intended to limit the invention. The figure is a side-view of an installation for the production of par-

ticle boards with a forming station provided with and connected to liquid dosage means, according to the invention.

A mat conveyor 1, which is an endless band, is arranged to be guided around guide rollers 2, 3, 4 and 5. Guide roller 4 can be driven by a motor 6 in the direction of the arrow. The upper part of the mat conveyor 1 can be passed through a heating press 9. By means of a strewing forming station 10, which can be replaced by any other known forming device, a particle mat 11 is formed on the conveyor. The forming station 10 moves on rollers 14 over guide rails 15 and hereby moves from its terminal position by means of a driving motor 10a in the direction of the arrow 12. Instantaneous with this movement particles are deposited on the mat by means of a particle depositing device 13, likewize driven by a motor 13a.

On both sides of the forming station 10, which are turned towards the bed conveyor 1, nozzles 17a and 17b are fixedly fitted, and these are connected to a dosage device 18, consisting of a double diaphragm pump, to which liquid is fed from preparation vessels 19a and b. On the respective connection conduit metering glasses 20a and b are arranged and are connected via three-way valves 21a and b. After the pump to the respective conduit are connected pressure equalizing vessels 22a and b and, in connection with the spray nozzles 17, magnetic valves 23a and b. If the spray nozzles are operated by compressed air, this is conveyed to these from a pump 45 via a filter 46 and a reducing valve 49. The compressed air can either be operated synchronous with the dosage pump 17 or be continuously connected.

The motor of the dosage pump 18a and the magnetic valves are operated synchronous with the particle depositing device 13 in such a manner, that the pump 18 starts and the magnetic valves 23 are opened, when the motor of the device is started. This is obtained by connection 24a and b of the motor 13a, the pump motor 18a and the magnetic valves via the same control switch 24.

When the forming station has reached its left hand

terminal position, the motor of the particle depositing device is stopped, and when the control current to this is switched off, the current to the pump is switched off at the same time and the magnetic valves 23 are closed, whereby the liquid supply ceases. The forming station thereafter returns to the terminal station by means of the driving motor without working of the particle deposition device, and thereby of the liquid dosage device.

While the forming station forms a particle mat section, as described above, the press 9 is closed. An intervening space, free from particles, can, if desired, at the same time be formed between the sections of the mat, which are to be pressed by means of a brush, saw or the like 16, which is moved at right angles across the width of the particle mat.

When the bed conveyor has conveyed the particle mat, deposited from the forming apparatus into the press, the forming apparatus is started anew at the relative position on the particle mat, where it was stopped in the preceding working step and here the dosage device also starts the liquid supply. The spraying thus also starts at the point, where it was previously interrupted.

At a continuously working device of the type described above, the amount of added liquid is at operation, adjusted with respect to the thickness of the particle mat, i.e. with respect to the speed of the forming apparatus. One advantage of the present process is that, if e.g. a thicker particle mat is desired, thereby giving resulting thicker board materials, it is only required that the speed of the driving motor for the forming apparatus is reduced, whereby the thickness of the particle mat will increase. As the forming station hereby will move slower, while the liquid supply equipment still supplies the same amount of liquid per time unit, the thicker particle mat will be sprayed with more liquid without requirements on adjustment of the dosage equipment.

CLAIMS

1. A method for supplying a liquid to a mat of wood particles or the like, which is to be pressed to board materials, the mat being formed on a mat conveyor by means of a forming station, characterized in that the liquid is supplied to at least one of the sides of the mat via liquid supply means, which are arranged in fixed connection to the forming station, and the liquid supply is synchronous with the deposition of wood particles or the like from the forming station.

2. A method according to claim 1, characterized in that the liquid outlet means are arranged on both sides of the forming station, turned towards the mat, and the liquid is supplied to the top-side and the under-side of the mat.

3. A method according to claim 1 or 2, characterized in that the liquid is supplied at the operation of the means for particle deposition of the forming station.

4. A method according to any of the preceding claims, characterized in that the forming station at the deposition of particles is moved along the mat conveyor.

5. A device for supplying a liquid according to claim 1 to a mat of wood particles or the like (11) to be pressed to board materials, the mat being formed on a mat conveyor (1) by a movably installed forming station (10), characterized in that at least one of the sides of the forming station is provided with liquid supply means (17), with driving device (18a), arranged for synchronous operation with the forming station.

6. A device according to claim 5, characterized in that both sides of the forming station (10) are provided with liquid supply means (17a, b), the respective means being connected to a dosage pump (18) via magnetic valves (23a, b), whereby the dosage pump and the magnetic valves are connected for synchronous operation with the driving device (13a) of the forming station for deposition of particles.

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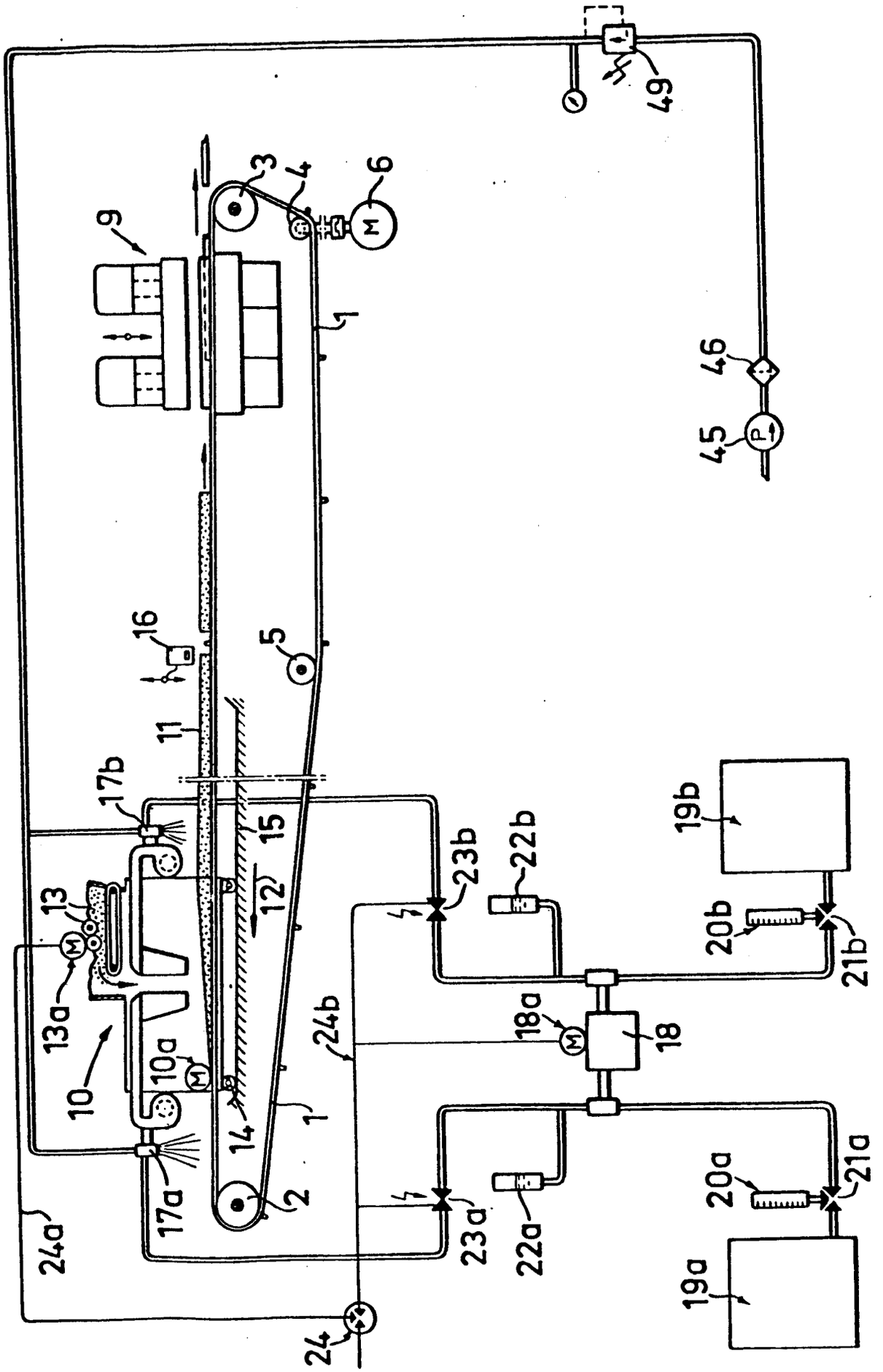
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European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 79 850 060.9

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
	US - A - 2 583 618 (F. WEYERHAEUSER) * whole document * --	1,2
A	DE - B2 - 2 421 284 (BISON-WERKE BÄHRE et al.) * column 1, line 50 to column 2, line 6 * --	
A	CH - A - 431 054 (BÄHRE-METALLWERKE KG) * column 5, line 59 to column 6, line 66 * --	
A,D	GB - A - 1 344 049 (BISON-WERKE BAHRE et al.) * page 2, lines 56 to 62 * ----	

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

B 29 J 5/04
B 29 J 5/00

TECHNICAL FIELDS SEARCHED (Int.Cl.³)

B 29 J 5/00
B 05 B 12/00

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Berlin	07-11-1979	PAETZEL

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