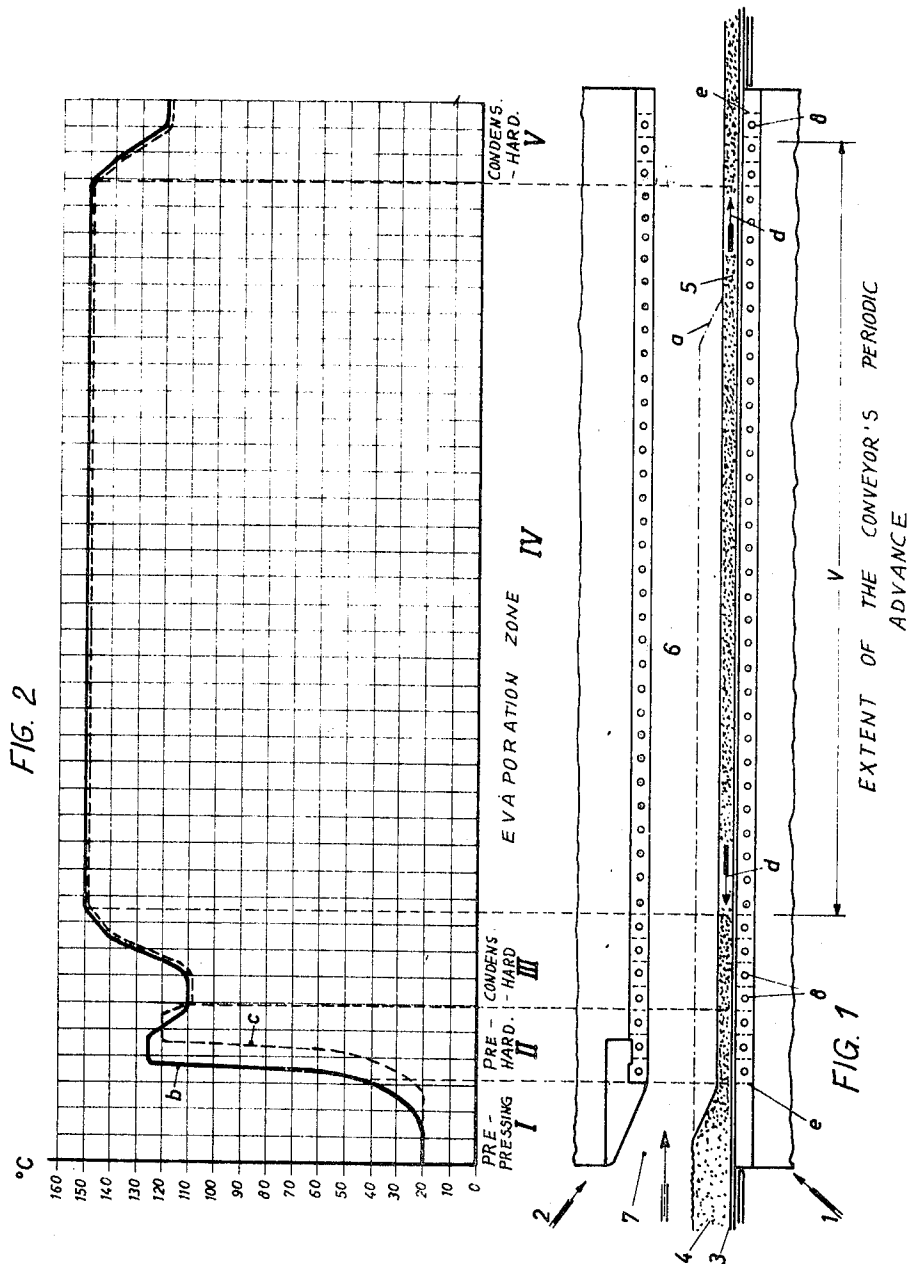


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METHOD OF MANUFACTURING ENDLESS WOOD CHIP WEBS
OR THE LIKE IN AN INTERMITTENT PRESS
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METHOD OF MANUFACTURING ENDLESS WOOD CHIP WEBS OR THE LIKE IN AN INTERMITTENT PRESS

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2 Claims

ABSTRACT OF THE DISCLOSURE

A method of manufacturing endless wood chip webs by advancing intermittently through a plurality of zones, while applying pressure and heat at each zone, a layer of wood chips and binding substance. The layer is passed through a pre-pressing zone at room temperature, through a pre-hardening zone at a sharply increased temperature, through a first condensation and hardening zone at a continuously increasing temperature, through an evaporation zone maintained at the increased temperature and through a second condensation and hardening zone which is at a temperature gradually decreasing from the temperature of the fourth zone to room temperature.

BACKGROUND OF THE INVENTION

The invention relates to a method of manufacturing continuous wood chip webs in an intermittent press from wood chip fleece spread on a conveyor, which corresponds in character to the desired structure of the web. The present application is a continuation-in-part of application Ser. No. 507,868, filed on Nov. 15, 1965, and now abandoned.

According to the invention, the wood chips are advanced intermittently by the conveyor for a part of its length through the heated press while being sealed through the employment of pressure and heat. It seems advantageous to guide the fleece-like material, for example, wood chip fleece, directly before its entrance into the pressing chamber, through a prismatic pre-pressing space which tapers in wedge-shaped form towards the pressing chamber.

An undesirable side effect has been produced in some instances when the above method has been carried out in practice. It seemed indeed, that the manufactured endless wood chip web had narrow cross streaks of lesser depth, concentration and firmness than the intermediate web portions, and in addition, was frequently more or less discolored.

The object of the invention is to do away with these streaks. It has been ascertained that the formation of streaks is due to the sudden temperature changes. The steam flowing in the direction of the press inlet, during the operation of the press, becomes condensed in the region of the temperature jump and additionally in a limited space, thus leading to damaging cross streaks.

The solution of this problem is effected by doing away with the abrupt temperature changes from house temperature at the press inlet to a heat temperature in the press and from the heat temperature in the press to room temperature and by employing larger so-called condensation zones.

After thorough investigations by the inventors, the formation of streaks in the completed pressed wood chip web could be traced to a collection of moisture on the corresponding places of the web. It is known that the

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wood chip fleece employed for manufacturing of wood chip web actually contains mechanically or chemically bound moisture which is driven out therefrom to a certain degree during each sealing and the ensuing vaporization of the partial length of the wood chip fleece in the press chamber. In this case, the steam escapes sideways from the press i.e. transversely to the direction of movement. A substantial part, however, flows also toward the press entrance and outlet, therefore in or against the direction of advance and outlets, therefore in or against the direction of advance. Since in this case no direct escape is possible, due to the continuous nature of the wood chip web, in contrast to the side edges, the steam condenses at the low temperature zones within the wood chip web at the entrance and outlet of the press in a tightly limited space.

It has been further discovered that the formation of very narrow zones of high moisture content, and thus of the above-described damaging cross streaks, could be avoided with the aid of the below described means, in a simple and certain manner. According to the invention, it is proposed to heat the press in such a manner that the full press temperature is maintained in an inner, comparatively large zone, i.e. a temperature at which the binding substance in the wood chip web will harden and the resulting moisture will evaporate. On both sides of this inner zone, the press entrance and the press outlet sides, a temperature should be maintained in the adjacent condensation zones, at which the greater part of the steam flowing from the inner zone will be condensed. By this method, the condensation in the wood chip web is not restricted to a small, narrow zone, but is distributed over a greater zone. The length of the zone must obviously be so chosen that the corresponding moisture content in this zone will not be damaging to the quality of the pressed wood chip web.

In a further development of the invention, there is maintained a temperature in the press, when viewed in the running direction of the web, in a second zone following the first condensation zone, which is somewhat higher than that of the first condensation zone, but which does not reach the full press temperature existing in the inner heating zone. The temperature in the second zone must be sufficiently high, so that no further condensation will take place in the second zone. Additionally, the temperature must be so great as to result in a certain binding between the binding substance and the pressed chips.

According to a further feature of the invention, the heating in the pre-hardening zone should be of such a different nature that the temperatures of the upper and lower press tables, viewed in vertical projection, rush ahead or after one another and the temperature viewed in the first condensation zone continuously reaches a maximum. The maximum temperature in the pressed wood chip web then extends along a diagonal plane, following the plane of the splice of the individual pressed lengths of the web. In the region of this diagonal plane, due to the increased temperature, there is attained a hardening of such extent that a good union is achieved in the path of the endless wood chip web, because no abrupt break is present between the individual pressed partial lengths.

It need not be further explained that the transition between the individual zones, namely the heat zone, the condensation zones and the pre-hardening zone, takes place continuously and not abruptly, which in any case would be hardly possible in production.

The heating of the press must obviously be so arranged that, viewed in cross-section of the corresponding wood chip web, no temperature differences will arise along the entire width of the run. This can be effected by heating the individual zones cross-wise of the conveyor using, for example, steam heated pipes extending inwardly of the

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press. The individual pipes of the upper and lower press table are then adjustably arranged, independent of one another, in order to achieve the desired temperature circulation in the press. Insulators may preferably be provided in the individual heating zones, so that these may be separated from one another.

The method according to the invention and the device therefor will be illustrated in the accompanying drawing.

In the drawing:

FIG. 1 is a schematic longitudinal section of the press; and

FIG. 2 illustrates diagrammatically a temperature course corresponding in scale to the press of FIG. 1.

The press according to the invention comprises a lower stationary press 1 and an upper, vertically retractable press table 2. The details of the press are not shown in the schematic illustration, because they are not the subject of the invention. A conveyor band 3, which may be a sieve band, is guided through the press. Wood chip fleece 4 is spread over the band and is sealed in the press under pressure and heat. The chip web is advanced stepwise into the press, according to the intermittent stroke of the upper press table 2. The position of the wood chip fleece, before the pressing and sealing, is indicated by the dotted lines. The chip fleece is led through a prismatic press chamber 7, before it enters the press chamber 6 proper, said prismatic press chamber being directed like a wedge toward the press chamber. This manner of introducing a chip fleece in a press has proven itself exceptional, particularly in the production of endless wood chip webs.

The press had different heating zones. Accordingly, a temperature is maintained in the first pre-pressing chamber zone which corresponds to the surrounding room temperature, perhaps increased somewhat by the heat radiation from the press. This zone is indicated by the reference numeral I. At the junction of this zone I the temperature rises steeply to a maximum of about 125° C. at the extended curve *b*, while the curve *c*, shown in dotted lines, reaches a temperature of only 120° C. The extended curve *b* represents the heating of the upper press table 2, while the dotted line curve *c* illustrates the heating of the lower press table 1. As may be observed from the path of the curve, the temperature of the upper press table corresponding to the curve *b* rushes first, ahead of the temperature of the lower press table, corresponding to the curve *c*, viewed in vertical projection. This means that the pressing plate in this region is heated more intensely by the upper press table 2. The temperatures get closer toward the middle of the press and finally reach the same temperatures at the cross-sectional point of both curves *b* and *c*. Thereupon the temperature of the upper press table 2 finally falls off faster than that of the lower press table 1. From this point on, the wood chip layer in the press is heated more intensively from below. A hardened joint is thus obtained, which effects a special binding of the panel in the transition zones between the individual pressed length portions. If the difference in heat were absent, this transition would occur abruptly, each time, in a plane perpendicular to the present plate's plane. It requires no explanation that this would be considerably worse.

At the junction with the pre-hardening zone II, both of the curves *b* and *c* run in about the same direction. They extend from a temperature of about 110° C. continuously to the highest temperature of 150° C. This zone, indicated as III, forms the so-called first condensation zone. The second condensation zone is indicated as V and is disposed behind a so-called heat zone IV which, as already mentioned, is at 150° C. In the second condensation zone V the curves *b* and *c* descend again to a lower temperature. During the pressing of the wood chip web 5, with the press closed, an exceptionally large yield of vapor takes place. This vapor can escape partly sideways at the press; however it also escapes partly in the direction of arrow *d* inwardly of the press, i.e. toward the press inlet

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and outlet. In the heat zones III and IV, this vapor should be condensed over a relatively large web length, so that the degree of moisture present will be insignificant. Were such a condensation zone not provided, the condensation at the press inlet and outlet would be restricted and at the same time the wood chip web would become so wet, that it would be practically unusable. As may be seen from the path of the curve, the temperature on both sides of zone IV at first falls slowly to a lower reading. It is through this quasi-linear fall that a good distribution of the condensation over the entire condensation zone is achieved.

It need not be explained further that the heating for each individual zone in the press must be separately controlled to achieve the temperatures indicated above by way of example. As shown in the schematic drawing of the press, this can be effected by providing hot water or steam heated channels 8, which are usually constructed as bores in the upper and lower press heating plates. The temperature may be regulated individually in each channel or in groups of channels. In certain instances individual groups may be constructed as separate elements which are insulated from one another. As shown in the drawing by the dotted line *e*, for example, a pair of channels 8 are arranged in each group.

In the area of the temperature zone IV, the hardening of the chip fleece takes place under pressure and heat. At the same time, the concentrated moisture is driven out of the chip fleece in the form of steam. This steam can escape partly sideways of the press; it flows, however, in the area of the temperature zones III and V. Now, there are no substantial drops of temperature between the zone IV and zone III, but the temperature gradually falls from 150° C. to 110° C. Therefore, the steam arriving from zone IV into zone III is not condensed in a tight limited narrow space transverse to the feed direction of the band, but, divided in the area of zone III. At the same time a condensation of the binding means follows in the outer panel sheets in the area of zones II and III, while the central surface of the panel exhibits at most a slight change of the binding substance. The reason therefore is that the temperature prevailing in these zones is less than in zone IV, so that the binding substance can not harden. A precipitate hardening in zone II and zone III would result in a loss of quality. In zone I there is only a slight moisture content which comes out at the zone II, and which is negligibly small. In zone III, a complete hardening takes place in the area bordering on zone IV. This border area will not harden a second time, as will be explained further, because a second hardening at the high temperature of zone IV would lead to an overhardening of the binding substance and to a shrinkage of the panels. A part of the steam driven out of the zone IV flows simultaneously in the area of zone V. Here, too, the temperature does not fall suddenly but slowly, in the longitudinal direction of the conveyor, to avoid the condensation of the steam in a tightly limited space.

The portion of the chip panel which was disposed in the area of the zone II and zone III lies in the last area of zone IV and in the area of zone V during the above press cycle. Since the binding substance in this area is only confined to a narrow border area by the previous press cycle, there now follows in this area a hardening in the zone IV and in the part of zone V bordering on zone IV. The travel of the conveyor is synchronized with the length of the press in such a manner that the part of the chip panel which is fully hardened in the border area of zone III and zone IV lies in the area of zone V, since the temperature is so low that a second hardening cannot take place.

Summarizing the above, the decreasing temperature in the longitudinal direction of the conveyor on both sides

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of zone IV serves firstly, the purpose of providing a relatively large condensation zone for the steam in the longitudinal direction of the conveyor and, secondly, to prevent a hardening of the binding substance in the area of the press entrance and a second hardening of a completely hardened panel in the exit area of the press. It should be noted that the pressure over the entire effective length of the press is the same.

It need not be explained further that the heating of the press is arranged in such a manner, that viewed in the direction of the entire width of the web, there are no differences in heating.

We claim:

1. The method of manufacturing endless wood chip webs in a press, which comprises: advancing and pressing intermittently through a plurality of zones of varying temperatures within said press, a layer of wood chips and binding substance of predetermined width and thickness as follows: first, to a pre-pressing zone increasing from an initial temperature of 20° C. to 40° C.; second, to a pre-hardening zone maintained at a temperature sharply increasing abruptly from 40° C. to 125° C. and decreasing gradually to 110° C., third, through a first condensation

and hardening zone at a temperature increasing gradually to a temperature of 150° C., fourth, to an evaporation zone maintained at a temperature of 150° C., fifth, to a second condensation and hardening zone wherein the temperature is gradually decreased from 150° C. to 120° C., the evaporation zone being substantially longer than said other zones.

2. The method according to claim 1, wherein said layer passing through said prehardening zone is headed more intensely on the upper surface than on the lower surface for 60% of the length of the zone.

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