May 1, 1951 W. C. GOSS 2,550,687

METHOD OF PRESSING IN A MULTIPLE PLATEN PRESS

Filed Nov. 16, 1948 2 Sheets-Sheet 1

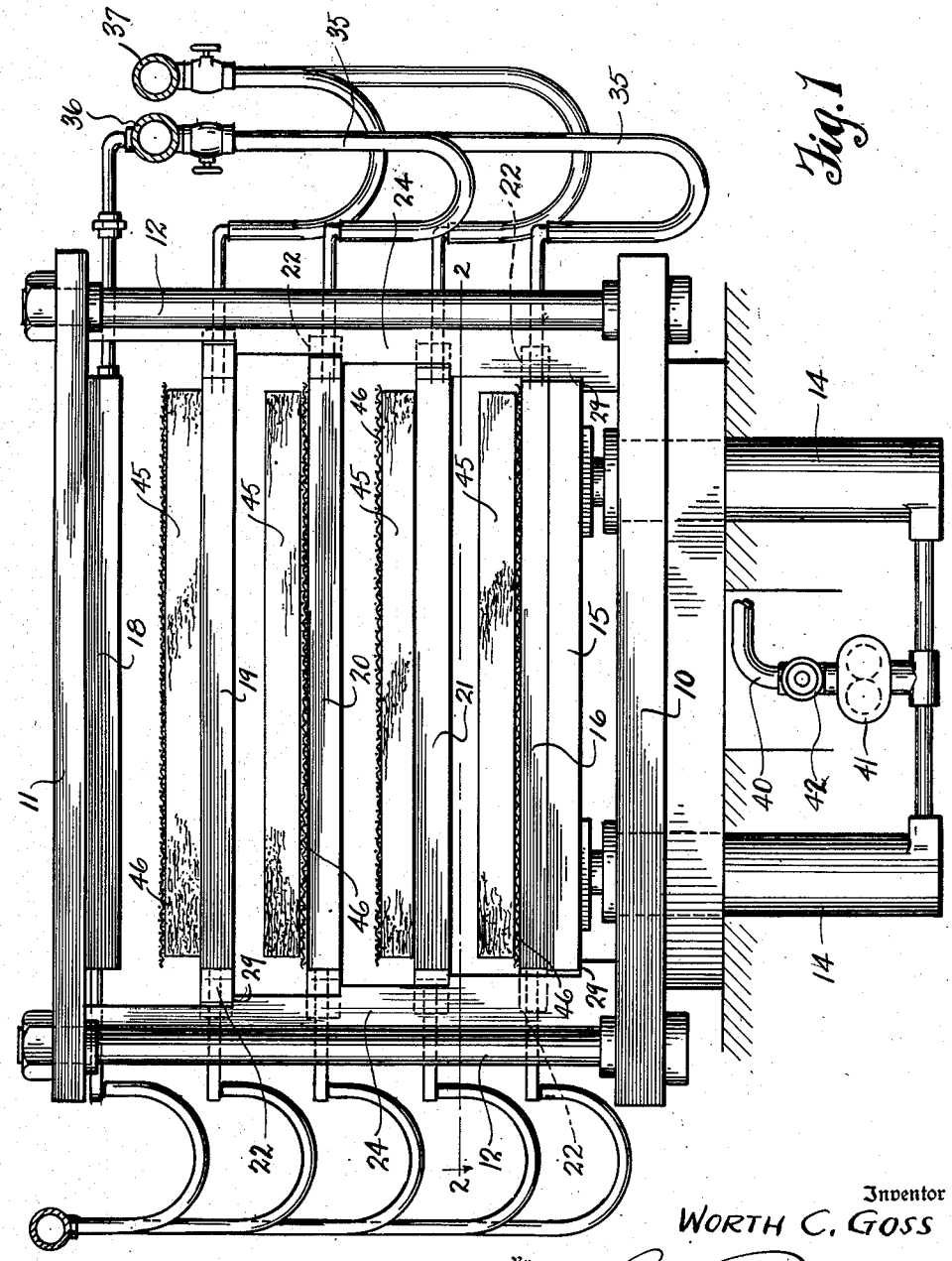


Fig. 1

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Fig. 3

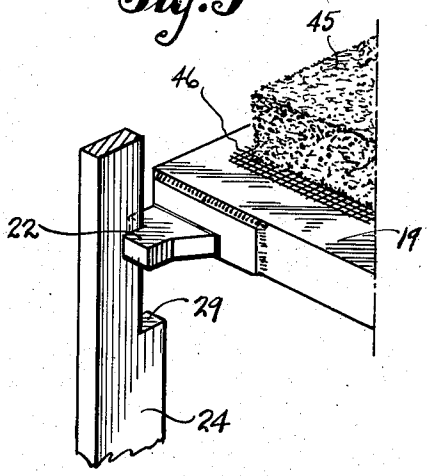


Fig. 4

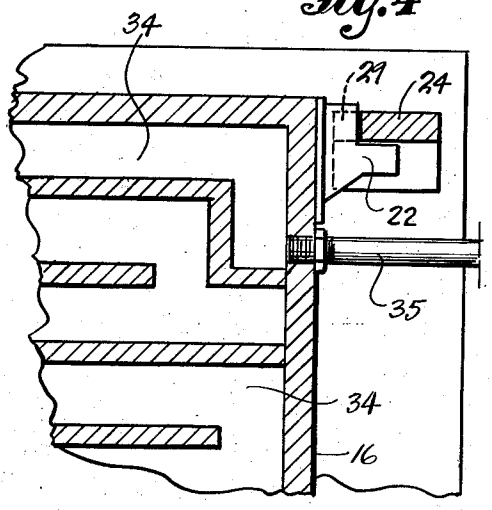
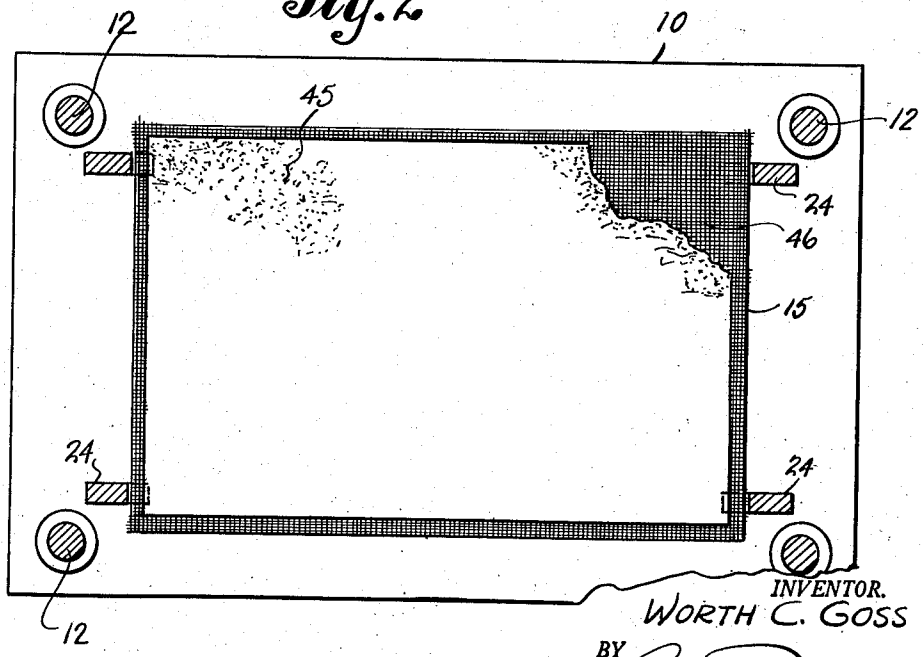


Fig. 2



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UNITED STATES PATENT OFFICE

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METHOD OF PRESSING IN A MULTIPLE PLATEN PRESS

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Application November 16, 1948, Serial No. 60,351

3 Claims. (Cl. 18—55)

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This invention relates to improvements in hot pressing, and it has reference more particularly to hot pressing in presses of the multiple opening types such, for example, as presses used in the manufacture of products known in industry as "sheet lumber" or "hard boards" and which products are made from wet or damp fiberized materials, formed into pads and the pads compressed between the plates or platens of a multiple opening press under the coalescing action of heat and pressure.

In the consolidating and coalescing of hard boards and the like from pads of damp ligno-cellulosic fibers, in hot plate presses, it is customary to place a wire mesh screen between one of the press platens and the pad of damp material in order to provide for a ready escapement from the pad of the steam that is generated therein in the pressing operation. While screens could advantageously be placed at both sides of the pad, the reason for not doing this is the desirability of having boards of this kind formed with one perfectly smooth surface, and such a surface would not be formed if a screen should be disposed thereagainst during the pressing operation.

In a co-pending application, filed on July 1, 1946, under Serial No. 680,838, now abandoned, now in a copending application filed under Serial No. 98,759. I have disclosed the pressing of sheet lumber from a homogeneous mixture of ligno-cellulosic fibers and a hydro-plastic bonding agent. The agent has been described therein as one having the property of setting while wet and hot and, by reason of this property, to make possible the removal of the consolidated board from the press while still venting steam from its pores. While the provision for safe removal of the board from the press while still venting steam has proven to be a great manufacturing advantage, due to the reduction of pressing time, it has been found further that in presses employing equal temperatures in the plates or platens for both the steam vented and the unvented sides of the board, the finished products will have opposite surface portions of high density of different thicknesses; that is, the fibers of the surface portions of the boards, that by reason of their intimate contact with the platens will be more fully plasticized and coalesced to layers of higher density than the main body portion, will be of unequal thicknesses at opposite sides of the boards, and by reason of this unequal volume of high density flanges, warping of the board to more or less extent will result upon its removal from the press.

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In another application, filed on July 1, 1946, under Serial No. 680,839, I disclosed that in the pressing of sheet lumber in a hot press, the formation of high density surface layers, or what I have referred to as "flanges," of unequal thickness and density, can be avoided by increasing the temperature of the platen or plate at the steam vented side of the board to a degree sufficient to compensate for the cooling effect of steam escaping through that surface. I have also disclosed that in the making of a common type of board according to my method, the increase in temperature should be approximately within a range of 100° F. to 150° F., that is, if the temperature of the platen at the unvented side of the board is 350° F., then the temperature of the platen at the vented side should be within the range of 450° F. to 500° F. in order that a board having opposite surface portions or flanges of equal density and thickness shall be formed. The temperatures used are governed somewhat by the thickness of the board and the water content of the pad.

It is desirable, from the standpoint of economy and manufacturing expediency, that multiple opening presses be used in the making of the present kind of lumber. However, such presses as used heretofore have not provided any means to prevent the formation of surface portions of unequal character. This has been due to the fact that it has been customary to retain the boards in the press until bone dry and baked to the same density throughout, thus eliminating any definite "flanges" or surface portions of higher density than body portion.

In view of the above, it has been the principal object of the present invention to provide a method of pressing in a multiple opening press for the simultaneous compression and coalescing of a plurality of pads or sheets of damp, fibrated material as arranged alternately therewith, into boards or sheets of lumber, each board to have one smooth surface, and wherein means for the venting of steam from the pads are associated with alternate platens of the series, and the temperature of said alternate platens of the series will be of such degree above that of the others as to insure the formation of surface "flanges" of the same density and thickness at the steam vented sides as at the other sides of the boards.

Furthermore, it is an object of the invention to so establish the temperatures of the platens at the vented and unvented sides of the boards, respectively, that in accordance with the character and thickness of the board being made, uniform-

ity of surface structure at both sides of each compressed sheet will result and all tendency of the finished sheet to warp by reason of the formation of unequal surface "flanges" will be avoided. Further objects and advantages of the invention are to be found in the combination and relationship in a multiple opening press of this kind, of platens of high and of lower temperature, alternating in the series, and steam venting screens associated with the platens of higher temperature only for the simultaneous production of two or more sheets or boards, each with one smooth surface.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein:

Fig. 1 is a side view of a multiple platen press embodied by the present invention.

Fig. 2 is a horizontal section taken on line 2—2 in Fig. 1.

Fig. 3 is a perspective view of a detail of the platen bracket design.

Fig. 4 is a horizontal sectional detail of platen construction.

Referring more in detail to the drawings:

The present press comprises a rectangular, horizontally disposed base structure 10 and a top structure 11, these parts being joined in fixed, vertically spaced relationship by tie bolts 12, passed therethrough at their four corners.

Mounted in the base structure 10 are paired hydraulic jacks 14—14 which support thereon a horizontal plate or frame 15 on which the lower platen 16 of the press is horizontally mounted.

Secured to the underside of the top structure 11 is a horizontally disposed press platen 18, and arranged between the platens 16 and 18 are independently movable platens 19, 20 and 21; all platens of the press are of the same length and width and all are in vertical alignment. The platens 19, 20 and 21 are equipped at their four corners with brackets 22 whereby they are mounted for vertical, guided movements in opening and closing operations, on vertical guide bars 24 that are extended between and fixed to the base and top portions 10 and 11 at opposite ends of the press as will best be understood by reference to Fig. 1.

When the plate 15 is fully lowered, the platens 16, 19, 20, 21 and 18 will be supported in spaced relationship as noted in Fig. 1. The platens 16, 19, 20 and 21 will be held in proper spacing by the engaging of the brackets 22 at their ends with upwardly facing shoulders 29 on the vertical guide bars 24. These stop shoulders of the bars are in stepped relationship and so arranged that the spacing of all the platens of the series will be equal and to such amount that the prepared pads of material to be simultaneously pressed between the succession of plates may be readily placed between them for consolidation upon closing the press.

It is to be explained also that all intermediate platens, as well as the upper and lower platens, are heated and, for my present purpose, the lowermost platen will be heated to a temperature of about 500° F. The next higher platen will be heated to a temperature of about 350° F., the next higher to about 500° F., and so on through the series. Higher or lower temperatures may be employed, depending upon the character or thickness of board being made. The means for heating the platens may be electric elements located in the platens or superheated steam admitted to passages provided therefor in the platens. In the present instance I have indicated the platens as being steam heated, each having steam channels 34, opening to an end thereof and to which flexible pipe connections, designated generally at 35, leading from separate supply lines 36 and 37, are joined, thus to maintain steam circulation and maintain proper platen temperatures at all times.

Pressure medium for control of the jacks 14—14 is delivered through supply pipe 40 and a pressure pump 41 and is admitted to or released from the jacks under control of a control valve 42. In connection with this hydraulic mechanism, suitable pressure gauges, not shown, would be employed to indicate pressing pressures being used. Also, indicators or other means would be used to show platen temperatures at all times.

It will be understood that with the press so designed, it can be fully opened by the lowering of the jack supported plate 15 to its lower limit. Then, with the press open, and the succession of platens in the relationship shown in Fig. 1, the pads of material to be pressed, here designated by reference numeral 45, are disposed between the platens, and steam-venting screens 46 are placed between the pads and the platens of higher temperature only. If additional means for steam escapement is necessary or desirable, this may be accomplished by providing those faces of the platens that are engaged by the screens, with a plurality of cross channels with slit-like openings to the platen faces and with ends open to the sides of the platens, as has been described and illustrated in my co-pending applications above mentioned.

With the pads of damp fibrous material in place, then the platens are moved toward each other by applying pressure medium to the jacks to lift plate 15. With the final closing of the press, all pads will be substantially equally compressed and their fibers coalesced under the simultaneous application of heat and pressure.

By reason of the use of the stated higher platen temperature at the steam vented sides of the pads, the cooling effect of escaping steam will be compensated for. After a few trial operations, the temperatures of platens of the two series that will insure formation of "flanges" of equal thickness may be very accurately established. The increase of temperature of the platen at the steam vented side is more or less in accordance with the increase or decrease of board thickness and the moisture content. The range herein given is practical for boards of 5/8 inch to 3/4 inch thickness.

Presses of this kind may be advantageously employed in the making of boards using a damp fibrated material as described in my applications above mentioned, or a material like that disclosed in the various patents of Mason, for example, as in United States Patents Nos. 1,663,503, 1,663,504 and 1,663,505.

Presses using the above described relationship of platens of different temperatures may be made in various designs, sizes and to receive various numbers of pads simultaneously. The essence of the present invention resides in the arrangement and use of steam vented platens of increased temperature, in alternate relationship with platens of a designated, substantially lower temperature, to bring about the formation of boards wherein the high density surface portions, or flanges, will be of substantially the same thickness, or at least will be of such structure as to

equalize each other in so far as their tendency to cause warping of the board is concerned.

Having thus described my invention, what I claim as new therein and desire to secure by Letters Patent is:

1. A method of simultaneously compressing and drying a plurality of compressible moisture containing pads, comprising, subjecting single pads to heat and pressure between the successive plates of a multiple opening press wherein alternate plates of the press are smooth surfaced for direct contact with the pads and heated to one degree of steam generating heat and the other platens are heated to a higher degree of heat, and wherein steam venting screens are located only between the pads and plates of the higher degree of heat; the temperature of said other plates being above that of the smooth surfaced plates sufficient to compensate for the cooling effect of escaping steam thereon.

2. A method for the simultaneous production of a plurality of compressed fiber boards, each having one smooth surface and both sides formed with dense surface flanges of equal thickness and a less dense body portion, comprising subjecting single pads simultaneously to heat and pressure between the successive plates of a multiple opening press wherein alternate plates are heated to a degree range between 300° F. and 350° F., and the other plates of the series are heated to a degree range between 400° F. and 500° F. and approximately 100° F. higher than the other plates, and wherein the plates of the lower degree range are smooth surfaced, and steam venting

means are provided at the surfaces of the plates of the higher degree range; the pressing operation being discontinued before the pressed pads become entirely dry.

3. A method for the simultaneous production of a plurality of boards from compressible moisture containing pads of bondable fibrous material, each board having at least one smooth surface and having dense surface flanges of equal thickness at opposite sides and a less dense body portion; the method comprising subjecting the individual pads to compression and heat between the successive plates of a multiple opening press wherein alternate plates are smooth surfaced to give the smooth surfaces to the boards, and heated to steam generating heat of a predetermined degree, and the other plates surface vented for escapement of steam from the boards along said vented surfaces, and heated to a degree of heat above that of the smooth surfaced plates sufficient to compensate for the cooling effect of the escaping steam.

WORTH C. GOSS.

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