June 23, 1953 R. CHAPMAN 2,642,782

FIBERBOARD FORMING PRESS WITH LOADER AND UNLOADER

Filed April 10, 1948 2 Sheets-Sheet 1

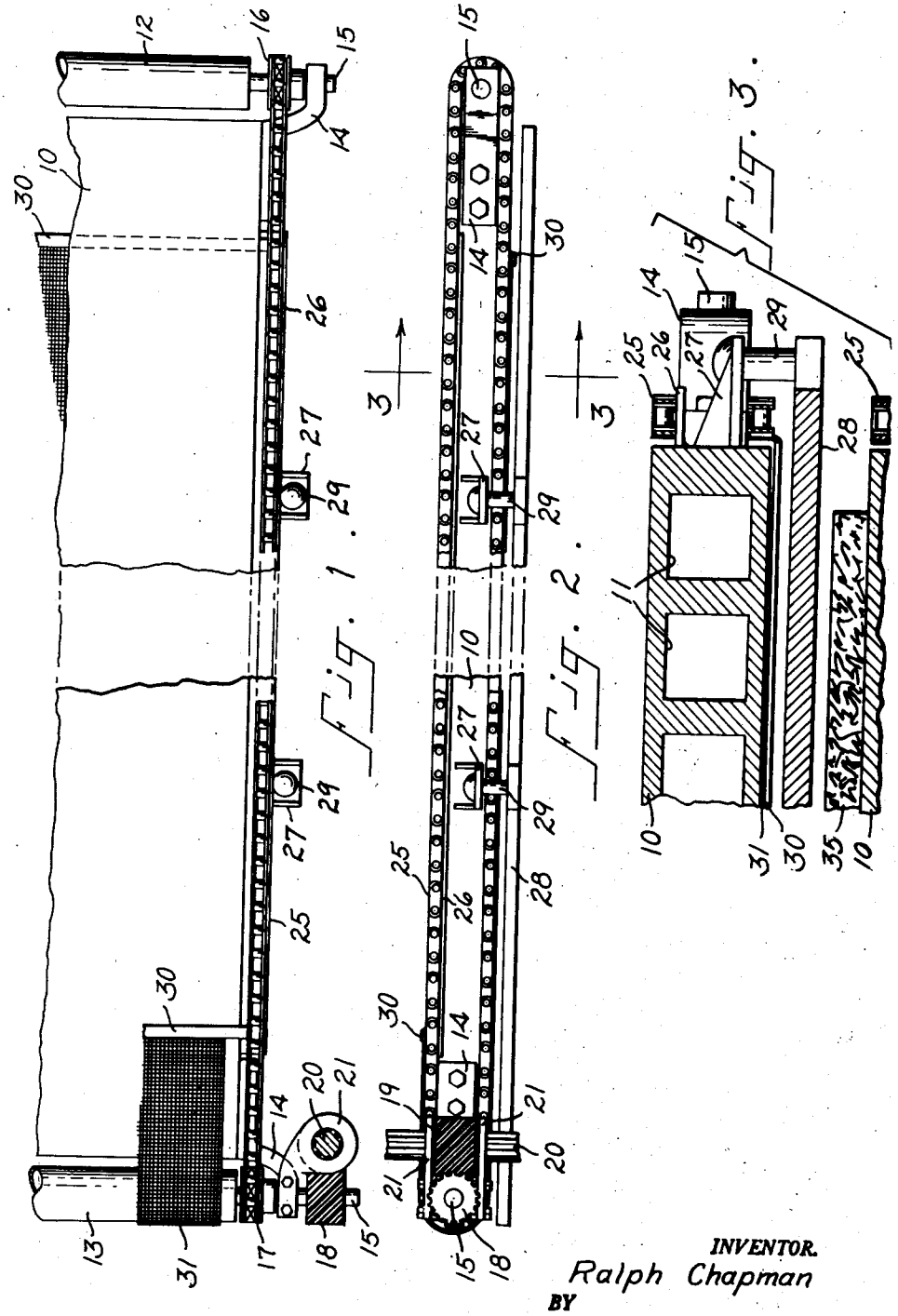


Fig. 1.

Fig. 2.

Fig. 3.

INVENTOR.
Ralph Chapman
BY
Burkhart and Chapman
Attorney

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FIBERBOARD FORMING PRESS WITH LOADER AND UNLOADER

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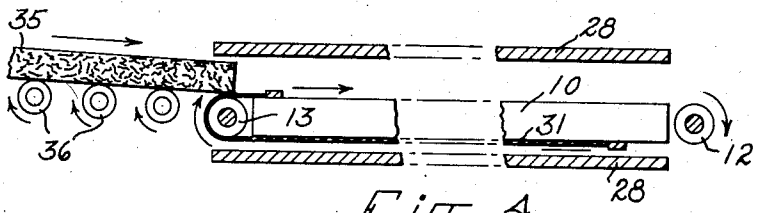


Fig. 4.

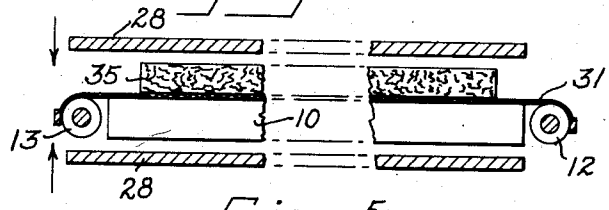


Fig. 5.

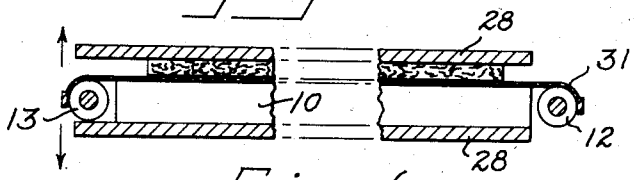


Fig. 6.

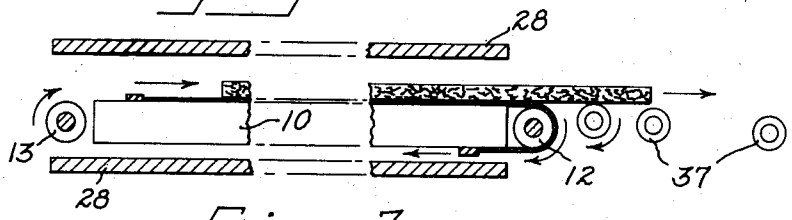


Fig. 7.

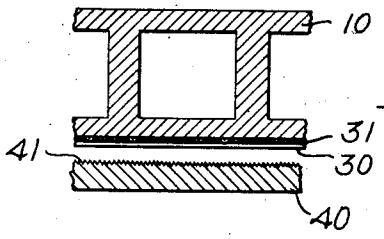


Fig. 8.

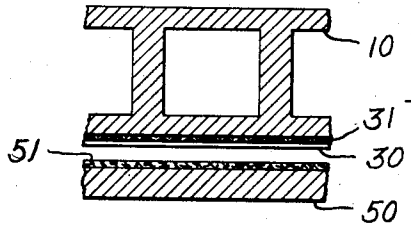


Fig. 9.

INVENTOR.
Ralph Chapman
BY
Buckhorn and Chapman
Attorney

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FIBERBOARD FORMING PRESS WITH LOADER AND UNLOADER

Ralph Chapman, Corvallis, Oreg., assignor to Chapman Forest Utilization, Inc., Corvallis, Oreg., a corporation of Oregon

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2 Claims. (Cl. 92—61)

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My present invention comprises an improvement in board-forming presses wherein a wet mat of fibre is consolidated into a board by the application of heat and pressure.

In the formation of artificial boards wood, straw, cornstalks, waste paper and other types of cellulosic material may be reduced to individual fibres by a number of means. The process of reduction may be mechanical in its entirety, or chemical, or a combination of the two. In the case of wood, the lengths of natural wood may be ground to small slivers, or may be first reduced to chips which are later crushed or otherwise reduced to slivers and individual fibres, with or without the aid of steam, hot water, pressure, or chemical treatment. The fibres are suspended in water to form a thin slurry and may have associated therewith a binding agent. For example, a phenolformaldehyde resin in incipient C-stage may be incorporated with the fibres in varying amounts, which resin is then precipitated upon the fibres and caused to be converted into insoluble, infusible, C-stage resin due to the influence of heat and pressure in the forming press of the present invention.

My invention comprises a forming press in which fibre mats formed in any of the foregoing manners may be compressed and heated to the desired extent to form boards of various thicknesses and densities, the boards being of the desired commercial sizes such as 4' x 8'.

In the operation of a press of the character described it is very difficult to load and unload the press in a rapid, efficient manner without disrupting the fibre mats. Heretofore it has been the practice to load presses by depositing the mats upon long, traveling screens which extend far beyond the press platens at either or both sides thereof so that a mat deposited upon a screen may be moved forward into the press, then, after consolidation, ejected from the press while still supported upon the screen. In some instances a mat is placed between two such screens which travel forwardly into the press, and in some instances a mat is placed between two steel plates which support the mat while the plates and mat move forward into the press as a unit. In all such presses it is desirable to have the temperature and pressure rapidly applied and just as rapidly removed after the desired period of time for creation of a board of the desired characteristics. Therefore, automatic means for feeding the mat and formed board must be provided, particularly in order that a multiple platen press may operate upon a plurality of mats simultaneously whereby production may keep pace with the operation of a mat-forming machine. With the prior press loading and unloading devices as heretofore described certain drawbacks existed which will be outlined below.

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For example, if a mat were sandwiched between two smooth face plates steam and hot water trying to escape from the wet mat would be blocked at both of the wide surfaces with the result that the steam and hot water would have to escape from the narrow, outer edges of the mat, if at all. This would result in excessive drying of some areas and continued softening of other areas as water at high temperatures, due to steam not being permitted to form, rushes to seek the easiest paths of escape. Further, if steam did form, it would be highly superheated and under terriffic pressure and the fibre mats would be disrupted and cracked. Further than this, the natural lignins or other binding substances of the fibre material and any added resinous binder or the like would be unevenly redistributed throughout the fibres, causing the formation of discolored spots and weak or soft spots in various irregular areas throughout the board. Also, sugars or other carbohydrate compounds present in the fibres or the mixture would be drawn to the surfaces of the mats and would char against the hot steel plates, forming discolored areas in the boards and building up deposits on the plates which destroy their usefulness as surface finishing members. In an attempt to correct this condition, a wire screen has been used as a feeding means, the screen traveling forward over the bottom platen of a pair of platens to feed the mat into the press and remaining in position above the lower platen to provide channels for the escape of steam and hot water as pressure and heat are applied. Since at least one surface of a board should be smooth when finished, this screen could not be endlessly disposed about a platen but was wound upon rollers at one or both ends of the platen. In some cases the screen was fed in one direction to feed a wet mat into the press and fed in the opposite direction to return the finished board to the same side of the press from which the wet mat was delivered, thus complicating the delivery and unloading mechanism and requiring delay in the operation of the entire plant. In other instances a long press-feeding screen was so arranged that a portion thereof extended toward the loading side for reception of a wet mat and a portion thereof extended beyond the opposite side for unloading of finished boards, the screen being fed intermit-

tently forward first to place the wet mats, then, in the same direction, to eject the finished board. This required a large floor area, long screens and a period of waiting while the screen was completely returned to its original position after delivery of the finished boards.

The object of my invention is to provide press loading and unloading means in which the screen is mounted upon endless chain means guided about feeding rollers at the ends of the press platens, the screen being associated with half of the chains and the space between the remaining half of the chains being open. By my invention the chain can be fed in the same direction at all times, thus simplifying the driving means therefor. The press feeding and unloading movement is accomplished simultaneously without pause between the two movements or reversal of direction of movement of the screen.

A further object of the present invention is to provide a loader and unloader for a board forming press which will operate in conjunction with an accumulator rack for wet mats.

The objects and advantages of the present invention will be more readily ascertained from inspection of the following specification taken in connection with the accompanying drawings wherein like numerals refer to like parts throughout, while the features of novelty will be more distinctly pointed out in the appended claims.

In the drawings:

Fig. 1 is a partial plan view of a press platen formed in accordance with my present invention;

Fig. 2 is a side view of the apparatus disclosed in Fig. 1;

Fig. 3 is a vertical section, on an enlarged scale, taken substantially along line 3—3 of Fig. 2;

Fig. 4 is a schematic representation of a press formed in accordance with the present invention at the moment of receiving a wet mat fed thereto from the accumulator rack;

Fig. 5 is a similar view showing the press in the act of closing;

Fig. 6 is a similar view showing the press at the instant it commences to open after formation of the board;

Fig. 7 is a similar view showing the press in the act of feeding a board into the unloading rack;

Fig. 8 discloses a modified form of surface plate which may be employed; and

Fig. 9 discloses a further modified arrangement of surface plate with heat retarding means.

In the present disclosure a single platen is illustrated and described. It is to be appreciated that this platen is but one of a plurality of superimposed platens mounted in a press capable of opening and closing the gaps between platens substantially simultaneously, a number of such presses being well known in the art.

The platen comprises a rectangular, hollow member 10 having passages 11 therethrough, through which a heating medium, preferably steam, is circulated. Other heating means may be incorporated in the platen, the sole requirement being that a rigid, smooth-surfaced body capable of sustaining its shape over the large area be heated to temperatures exceeding the boiling temperature of water. Various means may be associated with the platen to raise and lower it vertically whereby it may be separated from or brought into pressing relationship with adjacent platens. A pair of rollers 12 and 13 extend parallel to the ends of the platen 10, the rollers being mounted upon outrigger bearings 14 or the like through which roller supporting shafts 15 extend. The roller 12 is provided with a pair of sprockets 16, only one of which is shown, and the roller 13 is provided with a pair of driving sprockets 17, only one of which is shown. A spiral gear 18 is fixed to the protruding end of the shaft of roller 13 and is driven by a meshing spiral gear 19 which is splined to a vertical shaft 20 extending alongside one corner of the press. The gear 19 is caused to slide vertically of the splined shaft 20 as the platen moves by means of a pair of gear embracing arms 21 mounted upon the outrigger bearing support 14. The shaft 20 extends into any suitable driving mechanism whereby it may be rotated to a desired extent when desired. Upon rotation of the shaft 20 each of the driving sprockets 17 is rotated to advance a pair of sprocket chains 25 extending about the sprockets 16 and 17.

The upper or working flights of the sprocket chains 25 are guided upon guide bars 26 fixed to the side walls of the platens. The lower or return flight of sprocket chains 25 passes between a plurality of brackets 27 mounted upon the side wall of the platen, and the upper surface of a face plate 28 suspended from the brackets by a plurality of studs 29 screwed into the upper surface of the plate and passing through openings in brackets 27, the studs having their heads limited against downward movement by the brackets 27. The face plate 28 is preferably formed of stainless steel or faced with a noncorrosive metal such as chromium.

A pair of crossbars 30 extend between the pair of sprocket chains, the distance therebetween being approximately half the length of the chains, and a screen 31 is stretched between the crossbars. The screen 31 is therefore slightly longer than the length of the platen, being of sufficient length to extend partially about each of the end rollers 12 and 13 when the screen overlies the platen as seen in Figs. 5 and 6. When in this position the screen serves as a porous layer through which steam and hot water extruded from the wet mat may escape to the edges of the press. After the board is consolidated and the upper platen raised therefrom the screen may be fed forwardly half the length of the chains 25, thus causing the board to be ejected from the press. At the completion of a half-length movement of the chains 25 the screen is positioned between the face plate 28 and the lower surface of the platen, the face plate 28 having dropped as seen in Fig. 2 to provide a space through which the screen may travel. The screen may be arrested in this position until a succeeding wet mat commences to move into the press. Simultaneously therewith the shaft 20 may be actuated by any suitable manual or automatic control means to cause the screen to move forward half the chain length. The leading crossbar 30 therefore clears the roller 13 by the time the leading edge of the wet mat reaches the roller 13, and the screen, which is fed at a rate synchronized with the rate of movement of the wet mat, carries the wet mat into the press and is stopped when the mat is completely located between the platen and the face plate of the next upper platen.

In Fig. 4 the press is shown at the beginning of the feeding movement of a wet mat 35 thereinto from a plurality of rollers 36 set at an incline so that initial movement is all that is necessary to cause the wet mat to roll down into the press under its own momentum. The screen 31 has begun to move and the screen will continue to

feed the mat into the press until arrested as seen in Figs. 5 and 6. The press is closed to an extent such as to apply the desired pressure uniformly throughout the area of the mat and the temperature of the platens is maintained at the desired point determined as best for the particular material and end result. When the press is opened the screen moves forward to eject the finished board onto unloading rollers **37**. It is to be appreciated that any suitable feeding means to present the wet mat to the screen **31** and any suitable unloading means to receive the finished board from the screen **31** may be associated with the present invention.

In Fig. 8 there is disclosed a modification of the face plate which may be found desirable in the formation of boards from certain types of fibre or when employing certain chemicals with the fibres. It sometimes proves desirable to delay the application of heat to the upper surface of the wet mat, and for this reason heat transmission delaying means may be interposed between the face plate and the lower surface of the platen. Such means merely accomplish the reduction of the rate of heat transmission for a short period of time when the face plate first contacts the upper surface of the wet mat prior to the application of pressure upon the complete closing of the press. Fig. 8 discloses one manner in which this may be accomplished, the face plate **40** herein disclosed being provided with a plurality of parallel ribs **41**. The depth, arrangement and spacing of the ribs **41** may be varied as conditions warrant. A similar effect may be provided with the arrangement disclosed in Fig. 9 wherein heat delaying means such as a sheet of asbestos **51** may be placed upon the upper surface of the face plate **50**. The arrangement disclosed in Fig. 9 may be best, since the thickness and other characteristics of the sheet **51** may be varied by merely removing one sheet and replacing it with another.

It will be appreciated that the modifications disclosed in Figs. 8 and 9 are identical in the sense that a heat transmitting unit is suspended beneath the upper platen, which unit is platelike in form and which comprises a lower section of solid metal presenting a smooth lower surface throughout and having a high, uniform effective rate of heat conductivity, and an upper section having a uniform effective rate of heat conductivity lower than that of the lower section, the unit covering the entire surface of the platen. In Fig. 8, the lower section is the solid metal portion of the plate **40** and the upper section comprises the ridges **41** and the intervening air spaces provided by the grooves between the ridges. In Fig. 9, the lower section is the metal face plate **50** and the upper section comprises the asbestos sheet **51**. The air spaces between the ridges **41** and the asbestos sheet both retard the transmission of heat through the solid lower face plate to the upper face of the mat so as to delay the heating of the face of the plate in contact with the wet mat, just as the application of heat to the lower surface of the mat is delayed by the interposed screen **31**.

Having illustrated and described a preferred embodiment of my invention, it is to be appreciated by those skilled in the art that modifications in detail and arrangement thereof are permissible. All such modifications as come within the true spirit and scope of the appended claims are considered to be a part of my invention.

I claim:

1. A multiple unit hot press for forming artificial boards from mats of fibers, each unit thereof comprising a rectangular press platen adapted to be heated by an internally circulating heating medium, a first roll mounted on and extending parallel to one end of said press platen and a second roll mounted on and extending parallel to the opposite end of the press platen, a sprocket at each end of each roll and located beyond the side walls of the press platen, said sprockets being coaxial with and drivingly connected to their respective rolls, a sprocket chain passing about the pair of said sprockets at each side of said platen, a pair of spaced crossbars extending between said sprocket chains, a single screen stretched between said crossbars, a relatively thin, heat-transmitting face plate suspended beneath said platen, and suspension means for said face plate comprising brackets mounted upon the side walls of said platen and suspending members mounted in said brackets and movably supporting said face plate, said sprocket chains passing between the side walls of said platen and said suspending members, and the upper surface of said face plate having a plurality of closely spaced grooves therein providing small ridge areas in contact with the lower face of said press platen when the press is closed whereby to delay the transfer of heat to the upper surface of the mat during its formation into a board.

2. A multiple unit hot press for forming artificial boards from mats of fibers, each unit thereof comprising a rectangular press platen adapted to be heated by an internally circulating heating medium, a first roll mounted on and extending parallel to one end of said press platen and a second roll mounted on and extending parallel to the opposite end of the press platen, a sprocket at each end of each roll and located beyond the side walls of the press platen, said sprockets being coaxial with and drivingly connected to their respective rolls, a sprocket chain passing about the pair of said sprockets at each side of said platen, a pair of spaced crossbars extending between said sprocket chains, a single screen stretched between said crossbars, a relatively thin, heat-transmitting face plate suspended beneath said platen, and suspension means for said face plate comprising brackets mounted upon the side walls of said platen and suspending members mounted in said brackets and movably supporting said face plate, said sprocket chains passing between the side walls of said platen and said suspending members, and the upper surface of said face plate having a plurality of closely spaced projections thereon which contact the lower face of said press platen when the press is closed whereby to delay the transfer of heat to the mat during its formation into a board.

RALPH CHAPMAN.

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