April 19, 1932. H. P. L. LAUSSUCQ 1,854,341

PRESS FOR FIBER BOARDS

Filed March 19, 1931 4 Sheets-Sheet 1

Fig. 1.

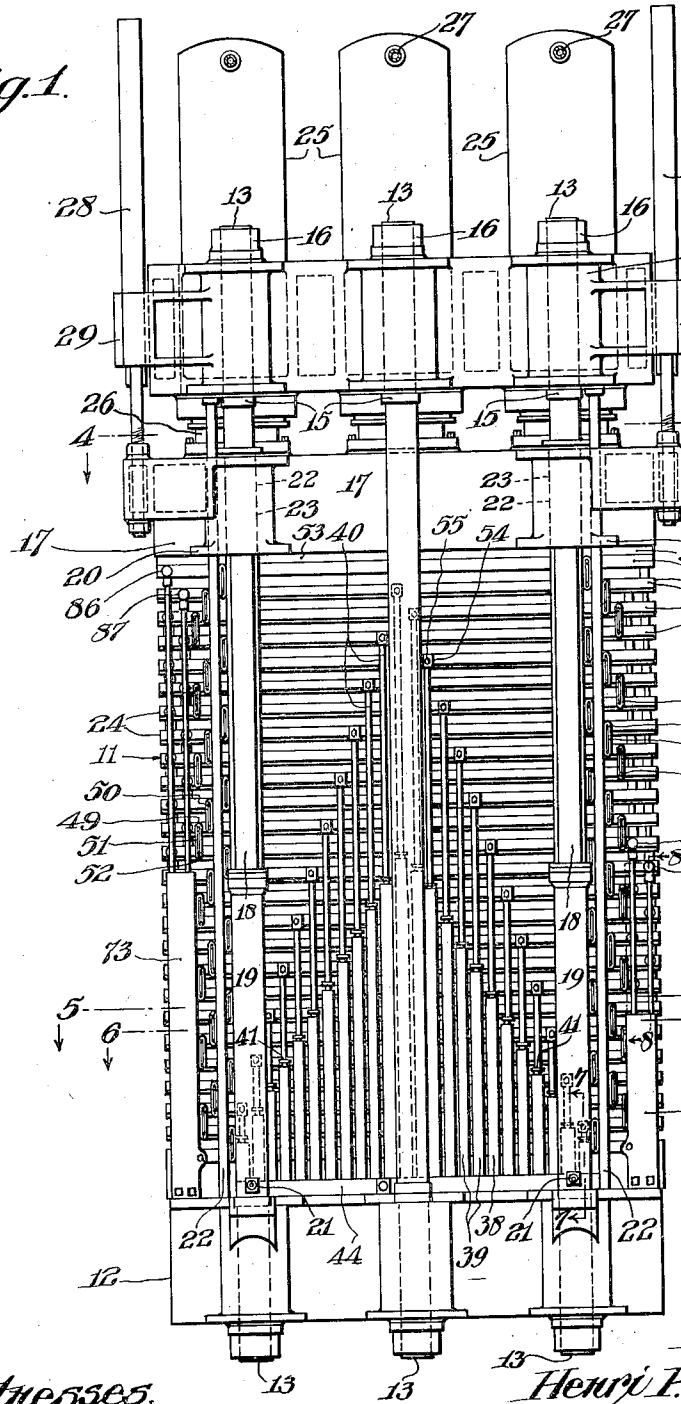
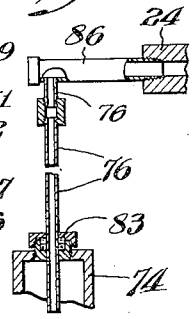


Fig. 8.



Witnesses.
Elmer W. Hacker
Geo. C. Jepson

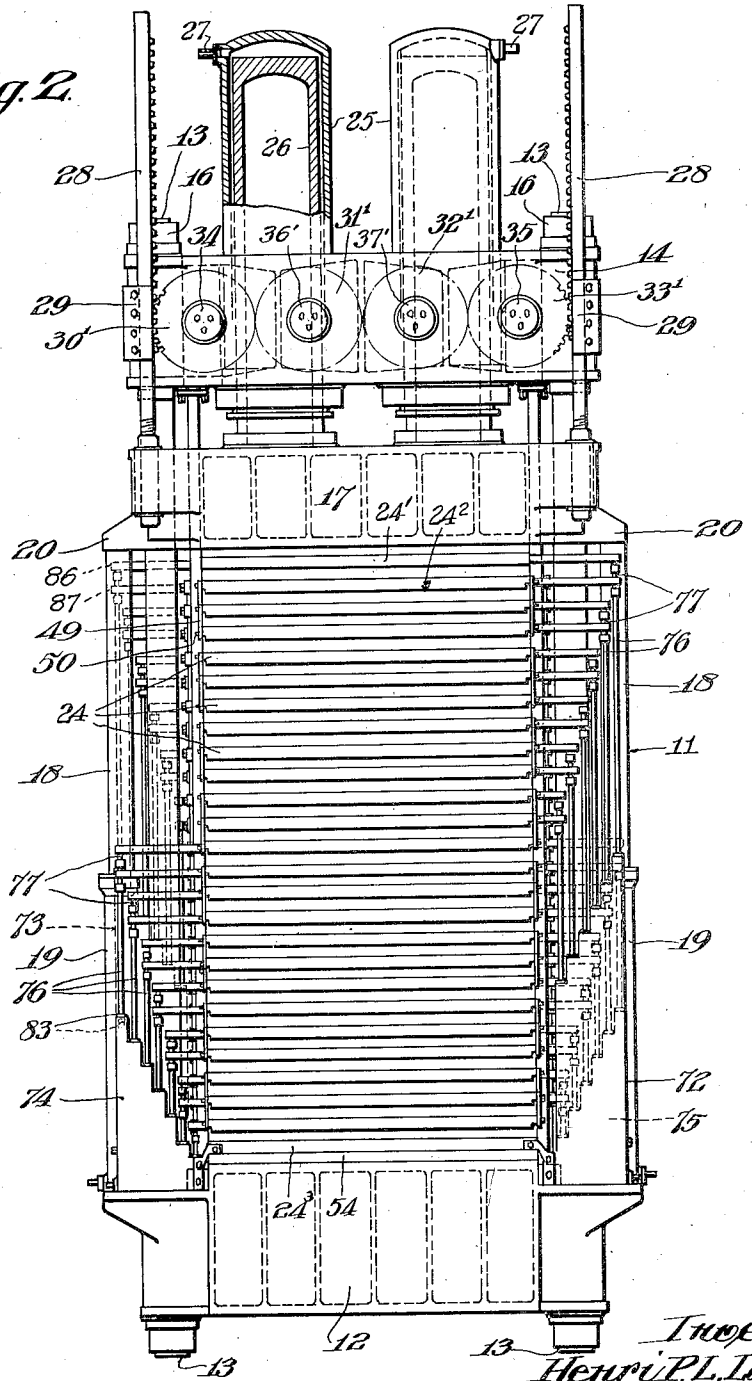
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PRESS FOR FIBER BOARDS

Filed March 19, 1931 4 Sheets-Sheet 2

Fig. 2.



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April 19, 1932. H. P. L. LAUSSUCQ 1,854,341

PRESS FOR FIBER BOARDS

Filed March 19, 1931 4 Sheets-Sheet 3

Fig. 3.

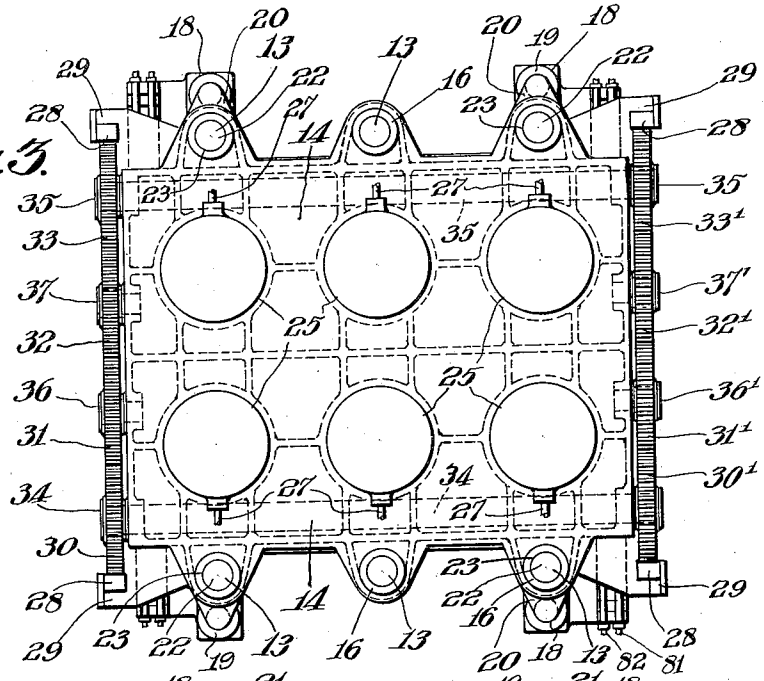
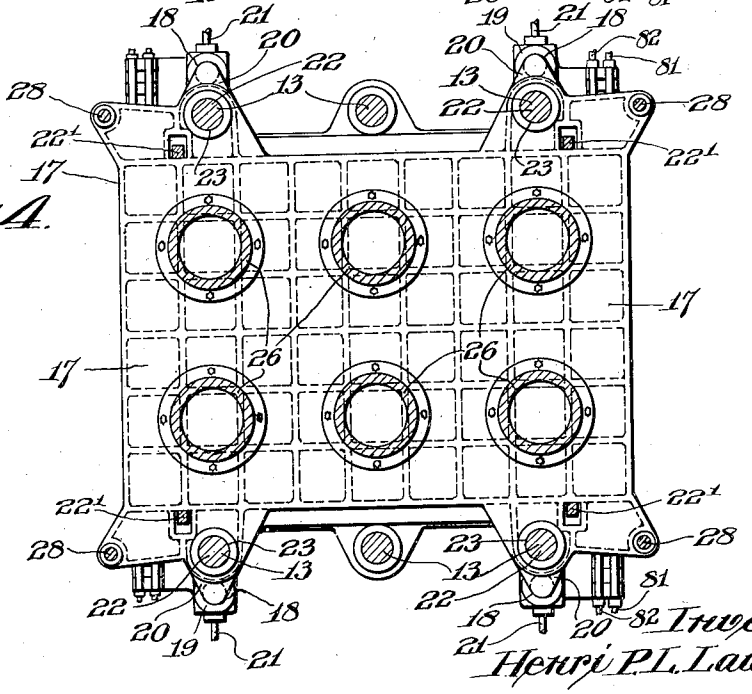


Fig. 4.



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April 19, 1932. H. P. L. LAUSSUCQ 1,854,341

PRESS FOR FIBER BOARDS

Filed March 19, 1931 4 Sheets-Sheet 4

Fig. 5.

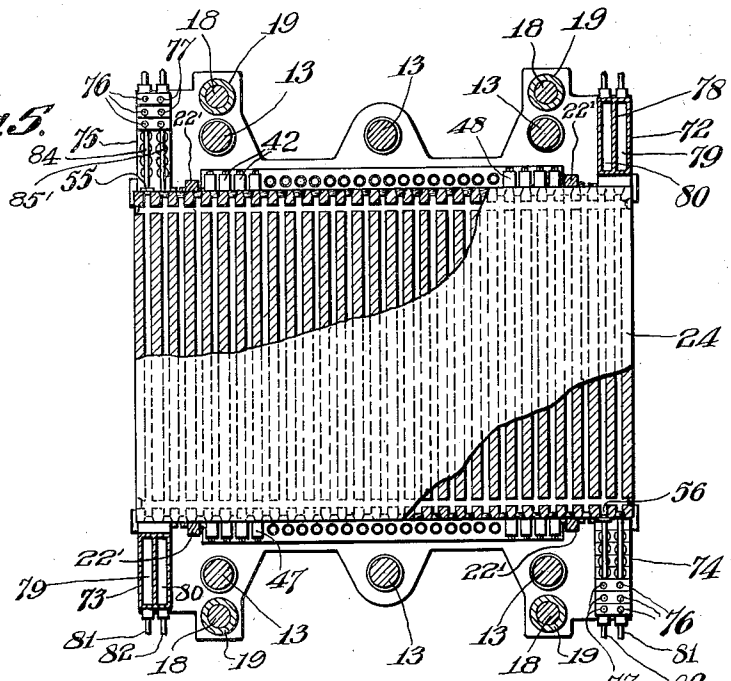


Fig. 6.

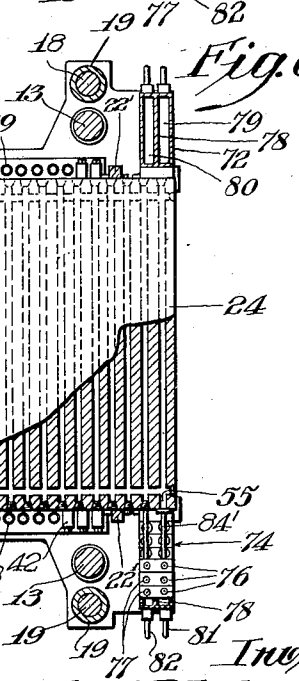
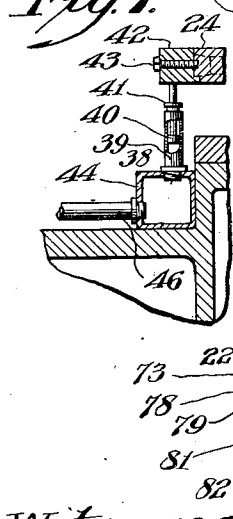


Fig. 7.



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Patented Apr. 19, 1932 1,854,341

UNITED STATES PATENT OFFICE

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PRESS FOR FIBER BOARDS

Application filed March 19, 1931. Serial No. 523,850.

In the manufacture of pulp board in large sheets under hydraulic pressure, the boards as pressed contain a high moisture content and correspondingly lack in cohesion and hardness. They require drying under pressure. My invention relates to a new drying press for these boards.

One purpose of my invention is to equalize the pressure upon the boards in such a press in order that the thickness and density of all of the boards of the same fiber content may be the same.

A further purpose is to provide a press in which all variable pressures upon the individual sheet caused by the weight of the platens and other parts of the press are eliminated.

A further purpose is to provide a press by which any desired pressure may be uniformly applied to the sheets contained in the press.

A further purpose is to provide a novel press having a series of movable platens and means for lifting the platens into spaced relation, for the insertion and removal of the sheets, and to provide means for counterbalancing the weight of the platens, whereby the weight of each platen may be individually counterbalanced, thus insuring that the pressure upon the boards, or sheets, shall be determined and controlled by the press and shall be uniform whether the board or sheet be positioned between platens located at the bottom, or top, of the pile of platens, avoiding variations in the thickness of the finished sheets.

A further purpose is to provide pressure responsive devices such as hydraulic jacks for supporting, or counterbalancing, the individual platens.

A further purpose is to hydraulically support the platens from a common source of pressure supply, whereby a uniform pressure may be applied to the platens for counterbalancing the weight of the latter.

A further purpose is to provide each platen with two counterbalancing means, which support the platen at diametrically opposite points thereof, for supporting the platen in a balanced horizontal position.

A further purpose is to provide a press of the character described with links between adjacent platens for limiting the tilting movement of the platens, and for limiting the distance the platens may be separated from each other.

A further purpose is to suitably guide the platens and hold them in vertical alignment.

A further purpose is to press the platens together wholly or partially by hydraulic pressure or by gravity, so that whole or partial release of the hydraulic pressure will permit the platens to be lifted and separated freely or will proportionally reduce the pressure applied to the platens when it is desired to subject the sheets to only a slight pressure.

A further purpose is to provide the press with pressure devices, in the form of hydraulic cylinders for applying pressure to the movable head.

A further purpose is to equalize the hydraulic pressure over the platens, whatever the pressure.

A further purpose is to provide means for applying a heating medium such as steam to the platens and for circulating the heat uniformly throughout the entire pile of the platens, by locating the inlet connections to alternate platens in vertical alignment, so that the hotter portion of one platen will be located adjacent to a cooler portion of an intervening platen.

A further purpose is to connect telescopically the heating medium and exhaust for each movable platen with fixed heating and exhaust manifolds, to facilitate the drying operation.

A further purpose is to provide manifolds having supply chambers and exhaust chambers, locate the manifolds at opposite corners of the press and arrange the pipe connections to form a criss-cross circulation of the heating medium through the alternate platens.

A further purpose is to arrange the manifolds in pairs of different heights according to the height in the pile of the platens to be served by them.

Further purposes of my invention will appear in the specification and in the claims.

My invention relates not only to the

methods disclosed but to apparatus by which the methods may be carried out.

Of the various structures by which my invention may be carried out I have preferred to illustrate but one, selecting a form which is practical, reliable and effective and which at the same time well illustrates the principles involved.

Figure 1 is a front elevation of a drying press embodying my invention.

Figure 2 is an end elevation of the structure seen in Figure 1.

Figure 3 is a top plan view of the structure seen in Figure 1.

Figure 4 is a horizontal section on line 4—4 of Figure 1.

Figure 5 is a horizontal section on line 5—5 of Figure 1.

Figure 6 is a horizontal section on line 6—6 of Figure 1.

Figure 7 is a fragmentary vertical section on line 7—7 of Figure 1.

Figure 8 is a fragmentary vertical section on line 8—8 of Figure 1.

In the accompanying drawings like reference characters refer to like parts.

The initial pressing operation upon wall board and other pulp board products leaves the "sheet" or "board" moist, relatively soft and with very little cohesion. In order to produce the commercial board it is therefore necessary to dry the sheet or board and the latter is quite desirably compressed during the drying to condense the product as the moisture is withdrawn. Some of the board made is highly compressed.

This operation for commercial reasons must be performed in stacks or piles of sheets or boards and has been complicated by the fact that the weight of the drying platens has been progressively transmitted to the sheets or boards so that a sheet near the bottom of a pile has been subjected to a much higher pressure than that which has been brought to bear upon a sheet high in the pile resulting in a difference in thickness and a corresponding reverse difference in density of the sheets produced.

My invention is intended separately to equalize or compensate for the pressure of the individual platens and separately to apply a pressure to all of the platens at the top of the pile and thus progressively and equally to the sheets between the platens. This makes the pressure uniform throughout and permits the amount of uniform pressure to be controlled wholly by control of the pressure upon the top of the pile.

My invention further does not interfere with but facilitates the ready and coincident separation of all the platens for loading purposes.

In my preferred form 11 represents a drying press, adapted for drying and pressing boards or sheets of fiber, which are formed upon another machine and then inserted between the platens of the press. The boards or sheets to be treated are often thin but the platens when in the open position are spaced apart far enough to permit ready insertion of the boards or sheets, whatever their thickness.

The press 11 rests upon a base 12, which is intended to be embedded in concrete, or otherwise secured in a fixed position. Rigidly connected with the base are upright supports or guides 13 which carry at their upper ends an upper frame member or top 14. The supports or guides are flanged at 15 to engage with the base and upper frame member and are rigidly held against them by means of nuts 16.

A movable press head 17 is slidably mounted upon the guides and is supported upon and elevated by means of four plungers 18, preferably of the hydraulic type. Each plunger is moved by the fluid content of a cylinder 19, supported upon the base. The head 17 is provided with outwardly projecting lugs 20 located immediately above the plunger 18 of each ram, to which lugs the plungers are rigidly secured. The cylinders 19 are filled and exhausted through pipes 21, thus providing means for supporting and lifting the head 17 and the other working parts associated with the head, hereinafter described.

Of the supporting bars 13, four are used as vertical guide bars 22, rigidly secured to the base 12 and to the under surface of the upper frame member 14, and pass freely through apertures 23 formed in the movable head 17.

My contemplated compensation of the weight of the platens and associated parts, as hereinafter explained, of course does not conflict in the least with the interchangeable construction of such presses, with either the upper or lower head or die movable and the other fixed. In showing the upper die as movable I therefore do not wish to be held to such an arrangement but have merely selected the more common form and expressly contemplate the use of the other form where preferred.

Spaced platens designated generally as 24 are provided within the frame between the base and the movable head 17 to receive the sheets or boards and to press and dry them. The platens 24 are hollow and are positioned horizontally, in a pile, one above the other, throughout the space between the base and the movable head. The platens are movable vertically to vary the spaces between them and are guided by the guide bars 22′.

Hydraulic cylinders 25 through their plungers 26 force downwardly the movable head and thus supply the desired pressure upon the platens and, through them upon the boards or sheets. The cylinders 25 are

provided with fluid pressure and are exhausted through pipes 27.

The movable head 17 carries four rack bars 28 rigidly secured to the head at the corners. The rack bars project upwardly through guide plates 29 secured upon the upper frame member 14, in which guide plates the rack bars are free to slide vertically. The teeth of the rack bars 28 are engaged by gear wheels 30, 31, 32 and 33 and 30′, 31′, 32′ and 33′, forming gear chains on opposite sides of the top as shown in Figures 2 and 3. The gear wheels of each chain are in operative engagement with the opposite rack bars 28, located at the front and rear of the top. The gear wheels 30 and 33, of one chain of gears, are rigidly mounted upon shafts 34 and 35, which are rotatably mounted in bearings in the top 14. Shafts 34 and 35 extend horizontally through the top and have their opposite ends rigidly secured to the gear wheels 30′ and 33′, respectively, forming parts of the chains of gears located at the opposite side of the top.

The two center gears 31 and 32, 31′ and 32′, of each chain are idlers and are freely rotatable upon stud shafts 36, 37, 36′, 37′, secured in the top. By this arrangement the rack bars 28 are geared together in such a manner that they must move simultaneously, and as the lower ends of the rack bars are rigidly secured to the movable head 17, the latter will move uniformly and maintain a horizontal position regardless of the point of application of the pressure applied to the head 17 by any of the several plungers 26.

Each of the movable platens is supported by two counterbalancing devices, which for convenience will be called jacks 38 and which are preferably hydraulic. Each jack consists of a cylinder 39 and a plunger 40 which is telescopically mounted in a suitable packing gland 41 located at the upper end of the cylinder. The upper end of each plunger 40 is provided with a head 42, which in turn may be secured to the platen by a bolt 43. The jacks are arranged in rows located upon the front and rear sides of the platens.

The lower ends of the cylinders of each row are connected with a header 44 secured upon the base. Each header is provided with a suitable pipe connection 46 through which pressure may be forced to and from the cylinders, thus completing the equipment of the hydraulic jacks for counterbalancing the weight of the platens. For lifting the platens into spaced relation to each other, so that sheets of material to be treated may be placed between the adjacent platens, push backs 18 are provided.

There are two jack plungers attached to each platen, and they are located at diametrically opposite points of the platen so that the line of connection between the points of jack support for each platen is vertically in line with the center of gravity of the platen.

There is a row of jacks similar to those shown in the front elevation, (Figure 1), located upon the rear of the press, as shown in the horizontal section, (Figure 5). Thus, the jack plunger whose head is seen at 47 on the front of the machine is secured to the same platen 24 as the plunger whose head is seen at 48, located on the rear of the press, the two being attached at diametrically opposite points of the latter. The other pairs of jack plungers are attached to the other platens in a like manner and the pressures are so chosen as to resiliently counterbalance, equalize and support the respective platens in a balanced horizontal position, whatever the height to which the platens have been set.

The jack cylinders 39 and their plungers, as shown in Figure 1, are preferably of different lengths and must take care of progressively different ranges of movement corresponding to and resulting from the positions of the different platens in the pile.

Obviously the compensation need not be exact as the purpose is not, academically, to secure a perfect action but to protect from objectionable accumulation of pressure which will unduly press the lower as compared with the upper sheets. Each platen and associated parts weighs many thousands of pounds and the sheets are also heavy. The weights of the sheets vary by hundreds of pounds, but this and any other variation in the weights to be compensated can be taken care of, whenever the variation becomes serious enough to be in the least objectionable, by adjustment of the pressure upon the jacks. In the best practice effort is made to avoid variation of more than a pound or two per square inch in the pressures upon the upper and lower sheets and very much closer approaches to equality of pressures can be secured.

Figures 1 and 2 show the movable head 17 in the elevated position in which it is supported by the hydraulic rams 18. The top platen 24′ is supported upon the movable head 17 and the other platens 24 are supported in spaced relation to each other by the counterbalancing jacks 38.

The platens are limited in the distances which they may be separated from each other, and also are prevented from tilting by links 49 connecting adacent platens.

Pins 50 project from the platens and enter elongated slots 51 in the links. The slots in the links are of a selected length so that engagement of the ends 52 of the slots with the pins will limit the distance the platens may be separated. When the platens are moved toward each other, the links will slide upon the pins to accommodate the movement.

The guide bars 22′ are located between two vertical rows of the links so that the links are interiorly guided by and will slide along the

sides of the guide bars, thus preventing the platens from moving horizontally out of vertical alignment. The guide bars 22′ are of rectangular cross-section, thus presenting flat surfaces toward the links.

The upper platen 24′ is rigidly secured to a filling plate 53, which in turn is secured upon the under surface of the movable head 17. Next below the movable platen 24′ is a platen 24^2. It is connected with the upper platen 24′ by pairs of the above mentioned links 49, and the successive movable platens 24 are connected together by other pairs of links in a similar manner. The lower platen 24^3 is held in a fixed position upon a filling plate 54, which in turn is secured to the base. No links are needed to connect the lower platen fastened to the base with the next movable platen above it, as the push backs would then strain upwardly against such links. All the other platens will be limited but the links in the extent of their movements toward and away from the platens above and below them. The limit of movement of the head takes care of the extent of opening between the two lowermost platens.

The platens may be of any type which can be heated and are here treated as hollow for the reception of steam, or other heating medium, for drying the sheets of material which are placed between the platens.

Each platen is provided with an inlet connection 55 and an outlet or exhaust connection 56, and these connections are positioned at diametrically opposite portions of the platen so that the heating medium will pass diagonally through the platen.

Heretofore it has been the practice to arrange the inlet connections with the platens vertically in line and attach said connections at corresponding portions of the adjacent platens. As there is always a drop in temperature between the inlet and outlet connections, the result of this practice was that the hottest portions of all the platens were located directly above and below each other, thus causing an uneven distribution of heat in the remaining portions of the platens. My invention provides a more uniform distribution of the heat throughout the entire pile of platens than did the prior practice, by locating the inlet connections of adjoining platens at different radial positions, or corners of the adjacent platens, thus altering the radial locations of the hottest portions of the successive platens throughout the pile of platens.

Figure 5 shows a platen with an inlet connection 55 and an outlet connection 56 located at diametrically opposite corners. Figure 6 illustrates a platen which is located immediately below the platen shown in Figure 5. An inlet connection 55 is located on the platen shown in Figure 6, immediately below the exhaust connection of the platen shown in Figure 5 and the platen shown in Figure 6 has an exhaust connection located immediately below the inlet connection of the platen shown in Figure 5. By thus alternating the inlet connections of the adjacent platens, the hottest portions of the platens, located near the inlet connections, will be staggered throughout the pile of platens, thereby providing a nearly uniform distribution of the heat throughout the entire pile of platens.

Manifolds 72, 73, 74 and 75 are provided for supplying the heating medium to and from the platens 24 through pipes 76 and 77 which are telescopically mounted to move axially, through suitable packing, in and out within the manifolds and are connected with the platens, thus permitting the platens to be moved vertically. The manifolds are mounted upon the corners of the base of the press and, with the pipes associated with them, are arranged in pairs.

Manifolds 72 and 73 are connected with the platens forming the upper half of the pile of platens. The other pair of manifolds 74 and 75 and the pipes associated with them need not be as high, as they are connected with the lower half of the pile of platens. By this distribution the manifolds can be made of small size, and can be arranged symmetrically upon the press.

Each manifold consists of a casing having a central vertical wall forming a baffle 78, thus forming within the manifolds a supply chamber 79 and an exhaust chamber 80. Suitable inlet and outlet connections 81 and 82 are provided upon the manifolds and communicate with the chambers to conduct the heating medium to and from a source of supply. The manifolds are constructed in step formation, and upon each step or level there are arranged two packing glands 83 in which are slidably mounted the individual inlet and exhaust pipes 84, 84′ and 85, 85′ having their upper ends attached to horizontal pipes 86 and 87 which in turn are connected with different platens and form the inlet and exhaust connections of two adjacent platens.

One of the telescoping pipes 84 is the supply pipe in Figure 5 and extends into the supply chamber of the manifold, and the other pipe 85 is the exhaust pipe and extends into the exhaust chamber of the manifold. The supply pipe 84 is connected with one of the platens and the exhaust pipe 85′ is connected with the next platen (Figure 6), immediately below the platen to which the supply pipe is connected. The supply pipe 84′ introduces steam into the platen shown in Figure 6. The pipes are thus arranged in pairs, each pair extending from different steps or levels of the manifolds.

The highest step or level of the manifold will accommodate the long pipes which are required for connection with the platens to

the upper portion of the pile, having the greatest movement, and the lower steps will accommodate the shorter pipes connected with the lower platens having less movement.

Two of the manifolds are of relatively higher construction than the other two and cooperate with the platens located at the upper portion of the pile. They are located at diametrically opposite corners of the platens, as shown in Figures 5 and 6. The steam from one circulates through the platen and passes out at the diagonally opposite corner to the exhaust chamber of the other.

The next lower platen is supplied with steam from the supply chamber of the manifold last named and exhausts through the former manifold, thus admitting steam to the corner of the platen directly below the exhausting corner of the top platen.

The steam passes through the second platen in a diagonal opposite direction relatively to the direction of travel of the steam in the top platen, and is exhausted at a corner diagonally opposite to that at which the upper platen exhausts.

The other pairs of pipes from the manifolds are connected with the platens alternately in a similar manner. All of the pipes will slide into the manifolds for a sufficient distance to permit the platens to be pressed together when the sheets are in place, to assure pressure upon the thin sheets inserted between them. Manifolds shown at the right hand side of Figure 1 and the left hand side of Figure 2, are of lower construction than those described and together form a pair located at opposite corners of the press, as shown in Figure 5. These manifolds are connected with the movable platens in the lower part of the press and with the bottom "fixed" platen in a manner similar to the connection of the manifolds above described.

The operation of my invention is as follows:

Pressure is constantly maintained within the jacks supporting the platens, the pressure being just sufficient to compensate for the weight of the platens and of their correlated parts.

A pressure medium, preferably water, is admitted from any suitable source to the four hydraulic rams for lifting the movable head and the motion is transmitted through the links for separating the platens into spaced relation to each other, as shown in Figures 1 and 2. The top platen is elevated by the rams as it is rigidly secured to the under face of the movable head.

The lowest platen is stationary, as it is secured upon the base. As the upper platen is raised, the slack permitted by its slotted link connection with the next platen is taken up. The lost motion between it and the next platen is then taken up and the next platen is lifted, and so on, progressively spacing the platens from the top down until all are spaced. When the platens are thus separated the sheets or boards which are to be treated in the press, may be inserted from either side of the machine into the spaces between the platens.

All the operating parts and the vertical guides and frame members are located upon the front and rear faces of the machine, as shown in the drawings, leaving the sides free for the insertion and removal of the boards or sheets.

After the sheets have been inserted between the platens, the pressure is released from the four rams 18 allowing the movable head 17 to move down upon the platens by gravity. The pressure in the counterbalancing jacks 38 is maintained at a sufficient value to equal the weight of the platens and their correlated parts (including, permissibly, the weight of the sheet or board which is to be placed upon it). It will thus be seen that the weight of the platens and of their correlated parts will not be added to the weight or pressure of the movable head which is imparted to the sheets or boards through the platens and the weight of the individual sheets or boards dried and pressed can also be counterbalanced.

Any pressure desired can be maintained on the sheets or boards. The dead weight of the movable head may be used. This may be reduced, if desired by use of partial pressure in the pull back cylinders and on the other hand, it may and normally will be greatly increased by fluid pressure within the main cylinders 25. Whatever pressure is to be applied to the sheets or boards must come from either gravity or from the main cylinders. If from gravity it is caused by the dead weight of the movable head 17 and main cylinder plungers, which may be partially supported by the pull backs so as to provide any pressure from zero to the full weight of the movable head and parts associated therewith. Any predetermined additional pressure can be applied through the medium of the main pressure cylinders.

The platens are heated preferably by steam through the manifolds and telescoping pipes associated with the latter and with the platens, which pipes are so connected with the different platens that the steam is admitted at alternate portions of the adjacent platens, so that the hottest portions of the adjacent platens will be staggered throughout the pile of platens and the steam will pass through the adjacent platens in criss-cross directions.

My invention is of great advantage in the manufacture of sheets or boards of different densities, as the trade requires boards of semi-hard density and also hard pressed boards. In my novel form of press, boards of any desired density may be produced and all the boards will be of uniform thickness and den-

sity due to the counterbalancing of the intervening platens, whereby the sheets or boards located at the top of the pile will be subjected to the same pressure as those at the lower portion of the pile of platens.

It will be evident that the use of the manifold avoids need of a pit for the ends of the pipes.

It will be evident that current carrying elements would take the place of the special steam handling construction if the heating be done by electricity.

It will be evident that the absolute control of pressures from zero to a maximum available by the use of the hydraulic pressure makes it possible to secure any extent of compression desired and that the relief from the weight of the individual platens and their associated parts makes the product uniform whatever pressure is selected.

It will be further evident that elimination of the weight of the individual platens makes it possible to use a higher stack of platens in each individual installation than would otherwise be practical and permits the platens to be designed with much less necessity for attention to likeness in weight than has previously been advisable.

It will be further evident that the invention does not interfere with the use of any special loading devices or other accessories and offers no complication to free introduction and withdrawal of the sheets or boards which are pressed and dried.

It will be evident that when the movable head is dropped by gravity, water can be filled into its cylinder by any suitable slack water filling system such, for example, as that shown in my Patent, No. 1,357,330, dated November 2, 1920.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain part or all of the benefits of my invention without copying the structure shown, and I, therefore, claim all such in so far as they fall within the reasonable spirit and scope of my invention.

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

1. The method of separating the platens of a vertically stacked pile of platens within a press and dryer for fiber board, which consists in individually compensating the weights of the platens and in shifting the platens vertically progressively from one end to the other by a vertically directed pulling force.

2. The method of maintaining uniformity of thickness in sheets or boards which are pressed and dried between stacked platens which consists in resiliently and individually compensating the pressure upon the sheets or boards by reason of the weights of the platens and pressing all of the platens against their respective boards by pressure common to all.

3. The method of producing boards or sheets of uniform thickness consisting of interposing the sheets between counterbalanced platens and subjecting the pile of sheets and platens to a pressure applied at one end of the pile of platens.

4. The method of producing boards or sheets of uniform thickness consisting of interposing the sheets between superimposed platens, placing the platens and the sheets under compression, and supporting the weight of each individual platen to relieve the sheets of the weights of the platens.

5. The method of controlling and unifying pressure upon sheets or boards during pressing and drying between stacked platens, which consists in separately and resiliently supporting the platens to eliminate their weights and applying pressure by gravity from the top to all of the platens.

6. The method of controlling and unifying pressure upon sheets or boards during pressing and drying between platens, which consists in separately and resiliently supporting the platens to eliminate their weight, applying pressure by gravity from the top and adjustably reducing the effective weight by resilient upward compensating pressure.

7. The method of maintaining uniformity of thickness in sheets or boards which are pressed and dried between stacked platens, which consists in individually supporting the weight of the platens and associated parts in whatever position vertically they occupy, in pulling the platens, one at a time progressively outwardly beginning at one end of the stack to open them for receipt of the sheets or boards and in applying the same pressure concurrently to all of the platens from one end of the stack while heating the platens.

8. The method of maintaining uniformity of thickness in sheets or boards which are pressed and dried between stacked platens, which consists in individually compensating for the weight of the platens and associated parts to support their weights in their positions of use, in opening the space between the platens progressively from one end of the pile to the other vertically, in inserting the sheets or boards while the platens are separated, in closing the platens together upon the sheets or boards and progressively pressing them by applying vertical pressure between the ends of the piles and concurrently heating the platens.

9. The method of producing boards or sheets consisting of interposing sheets between hollow platens, placing the platens and sheets under compression and passing a

heating medium through the adjacent platens in opposite directions.

10. The method of producing boards or sheets of uniform thickness consisting of interposing the sheets between hollow platens arranged in a pile, passing, a heating medium through the adjacent platens in opposite directions, placing the platens and sheets under compression and supporting the weights of the individual platens to relieve the sheets of the weights of the platens.

11. In a press comprising a plurality of stacked platens for drying intervening press board, the method of equalizing the heating of the platens, which consists in applying the heating medium to adjoining platens at different points so that the hottest part of each platen will lie opposite a cooler part of the next platen.

12. A press having in combination a series of platens arranged one above the other in spaced relation for receiving material between them which is to be operated upon, and counterbalancing means associated with each platen arranged for supporting the weight of the same.

13. A press having in combination a series of platens arranged one above the other for receiving material between them which is to be pressed, and counterbalancing means attached to diametrically opposite portions of each platen arranged for supporting the weight of the platen.

14. A press having in combination a frame, a series of platens positioned horizontally in said frame arranged to receive a layer of material between them, a head movably mounted in the frame for applying pressure to the series of platens, and counterbalancing means for the individual platens whereby the pressure applied by the movable head is equally distributed throughout the series of platens.

15. A press having in combination a frame, a series of platens positioned one above the other and movably mounted within said frame, a head movably mounted in the frame arranged for applying pressure to the series of platens, and pressure actuated plungers operatively associated with each platen arranged for counterbalancing the weight of each platen.

16. A press having in combination a frame, a series of platens positioned one above the other and movably mounted within said frame, a head movably mounted in the frame arranged for applying pressure to the series of platens, pressure actuated plungers arranged in rows located upon opposite sides of the platens, each platen being connected to diagonally opposite plungers, one plunger from each opposite row associated therewith arranged for individually supporting and counterbalancing the platens.

17. A press having in combination a frame, a series of platens positioned one above the other and movably mounted within said frame, a head movably mounted in the frame arranged for applying pressure to the series of platens, headers mounted upon the frame at opposite sides of the series of platens, jack cylinders connected with the headers, plungers slidably mounted in said cylinders, means for attaching each platen between two of said plungers located at diametrically opposite points of the platen, and connections upon the headers for supplying a pressure medium thereto for lifting the platens by means of said plungers.

18. A press having in combination a frame, a series of platens positioned one above the other and movably mounted within said frame, a head movably mounted in the frame arranged for applying pressure to the series of platens, pressure-actuated plungers mounted upon said frame, means located at diametrically opposite points of said platens for operatively associating the platens between a pair of said plungers for supporting the platens in equilibrium, and links operatively associated with the adjacent platens for limiting the relative separating movements of the platens.

19. A press having in combination a frame, a series of platens positioned one above the other and movably mounted within said frame, a head movably mounted in the frame arranged for applying pressure to the series of platens, weight counterbalancing means operatively associated with the platens, links having elongated slots formed therein, and pins upon the platens arranged to occupy the slots of the links for slidably connecting the links between two adjacent platens and for limiting the relative movement of the platens.

20. A press having in combination a series of platens arranged one above the other in spaced relation for receiving material which is to be treated between them, counterbalancing means associated with the platens arranged for supporting the weights of the individual platens, a head positioned above the platens for applying pressure upon all of the platens, and lifting means associated with the head for lifting the latter for reducing the load applied to the platens due to the weight of the head.

21. A press having in combination a frame, a series of platens positioned one above the other and movably mounted within said frame, a head movably mounted in the frame arranged for applying pressure to the series of platens, pressure actuated plungers operatively associated with each platen arranged for counterbalancing the weight of each platen, and a pair of pressure actuated plungers associated with said head arranged for lifting the head for reducing the weight of the latter upon the platens.

22. A base, a top, guides rigidly connecting the base and top, a head slidably mounted

upon the guides, a series of platens located between the base and said head, weight counterbalancing means for the individual platens, pressure actuated devices operatively associated with the base and the head arranged for lifting the head from the platens, and pressure means for moving the head toward the platens.

23. A press having in combination, a series of platens and inlet and exhaust connections upon each platen through which inlets a heating medium is admitted to the platens, and said inlet connections upon the adjacent platens located in angularly different relative positions about the platens whereby the hottest portions of the adjacent platens will be staggered throughout the series of platens.

24. A press having in combination a plurality of platens, said platens being of rectangular formation, an inlet connection located adjacent to the corner of one of said platens for admitting a heating medium thereto, and an inlet connection located adjacent to a relatively different corner of the next adjacent platen for admitting a heating medium to the last mentioned platen.

25. A press having in combination a frame, a series of platens arranged in a pile and movably mounted relatively to the frame and to each other, inlet and outlet connections upon the respective platens, pipes connected with said inlet connections, casings in which said pipes are slidably mounted, and connections upon said casings through which a heating medium is admitted and conveyed through said pipes to the platens.

26. A press having in combination a frame, a series of platens arranged in a pile and movably mounted within the frame, said platens being of hollow formation, inlet and outlet connections upon each platen, manifolds located at diametrically opposite portions of said frame, pipes connected with said inlet and outlet connections, said pipes slidably mounted in said manifolds, and pipe connections upon the manifolds through which a heating medium is supplied to the manifolds and conducted through said pipes to the platens.

27. A press having in combination, a frame, a series of platens arranged in a pile and movable within the frame, a manifold mounted upon said frame, pipes of various lengths having their lower ends slidably mounted in said manifold and connected at their upper ends with the platens located at different levels, and said manifold constructed in step formation for the entrance of the short pipes at the low steps and the long pipes at the high steps.

28. A press having in combination a frame, a series of platens arranged in a pile and movable within the frame, manifolds mounted upon said frame at opposite sides of the pile of platens, connections upon said manifolds through which a heating medium is supplied to the manifolds, pipes having their lower ends slidably mounted in the manifolds, connections between the upper ends of the pipes of one manifold connected with alternate platens, and connections between the upper ends of the pipes of the opposite manifold and the platens interposed between the platens to which the first mentioned pipes are connected.

29. A press having in combination a frame, a series of platens arranged in a pile and movable within the frame, manifolds mounted at opposite sides of the pile of platens, each manifold having a supply chamber and an exhaust chamber formed therein, connections upon said manifolds through which a heating medium is supplied to said supply chambers and exhausted from said exhaust chambers, supply pipes having their lower ends slidably mounted in the manifolds and communicating with said supply chambers thereof, connections between the upper ends of the supply pipes of one manifold connected with alternate platens, connections between the upper ends of the supply pipes of the opposite manifold and the platens interposed between the platens to which the first mentioned supply pipes are connected, exhaust pipes having their lower ends slidably mounted in said manifolds and communicating with said exhaust chambers thereof, connections between the upper ends of the exhaust pipes and the respective platens with which the supply pipes from the opposite manifold are connected, whereby the heating medium from the supply chamber of one manifold will be conducted through one platen to the exhaust chamber of the other manifold located upon the opposite side of the pile of platens and the heating medium will be conducted through the next adjacent platen in a reverse direction.

30. A press having in combination a fixed frame member, a head slidably mounted relatively to the frame member, racks secured to the head at angularly spaced positions and gearing operatively mounted upon the fixed member in operative engagement with the racks arranged for insuring the parallel relation of the head with the frame member.

31. A press having in combination a fixed frame member, a movable head, rack bars secured upon the movable head, guides upon the frame member in which the rack bars are slidable vertically, gear wheels rotatably mounted upon the frame member, said gear wheels forming chains of gear wheels located at opposite sides of the frame member, each chain of gear wheels arranged in mesh with two of said rack bars, and a shaft rotatably mounted in the frame member upon which one gear wheel of each chain is rigidly secured.

32. A press having in combination a fixed

frame member, a movable head, platens arranged in a pile below said head, rack bars secured upon said head, guides upon the frame member in which the rack bars are slidable vertically, gear wheels rotatably mounted upon the frame member arranged in operative engagement with the rack bars for insuring the simultaneous movement of all the rack bars, links connected loosely between the head and the next adjacent platen, and links connected between the adjacent platens arranged for limiting the movement of the platens relatively to each other and to the head.

33. A press having in combination a frame, a head movably mounted upon the frame, a series of platens arranged in a pile within the frame, means for lifting the head relatively to the platens, counterbalancing devices upon the frame, means for attaching two of said devices to each platen at diametrically opposite points of the latter, and links and connections between the head and the next platen and between the platens, to limit separating movement of the platens.

34. A base, a top frame member, vertical guide frame members rigidly secured to said base and engaging said top member, a head slidably mounted upon the guide members, means mounted upon the top frame member arranged for applying a downward pressure upon the head, a series of hollow platens arranged in a pile located between the base and the head, pressure actuated means mounted upon the base and operatively associated with the head for lifting the latter relatively to the platens, hydraulic jacks mounted upon the base arranged for supporting the individual platens, manifolds upon the base for receiving a heating medium from a source of supply, two of said manifolds located at diametrically opposite corners of the platens forming a pair of relatively high construction, relatively long pipes slidably mounted in said pair of manifolds and connected with the platens which are located at the upper portion of the pile, and two others of the manifolds located at the remaining opposite corners of the platens forming a pair of relatively low construction, and relatively short pipes slidably mounted in the last mentioned pair of manifolds and connected with the platens which are located at the lower portion of the pile.

35. A base, a top frame member, vertical guide frame members rigidly secured to said base and engaging said top member, a head slidably mounted upon the guide members, means operatively associated with the head and top frame member for maintaining the head in a horizontal position, pressure responsive means mounted upon the top frame member arranged for applying pressure upon the movable head, a series of platens arranged in a pile located between the base and the movable head, links mounted upon adjacent platens and upon the movable head for limiting the distance the platens may be separated from each other and from said head, said links arranged to permit the platens to move toward each other, vertical guide bars secured upon the base and engaging the top frame member located at opposite sides of the platens and between which the platens are movable, pressure-actuated means mounted upon the base and operatively associated with the movable head for lifting the latter relatively to the platens, a row of hydraulic jack cylinders mounted upon the base at opposite sides of the platens, plungers slidably mounted in the jack cylinders arranged for supporting the individual platens, inlet and outlet connections upon each platen for the passage of a heating medium, manifolds mounted upon the frame, and pipe connections between the manifolds and said connections upon the platens.

36. A base, a top frame member, vertical guide frame members rigidly secured to said base and engaging said top member, a head slidably mounted upon the guide members, means operatively associated with the head and the top frame member for maintaining the head in a horizontal position, pressure responsive means mounted upon the top frame member arranged for applying pressure upon the head, platens having passageways formed horizontally therein, said platens located between the base and the head, vertical guide bars secured upon the base and engaging the top frame member upon which the platens are slidably mounted, hydraulic rams mounted upon the base and operatively associated with the movable head for lifting the latter relatively to the platens, hydraulic jacks mounted upon the base arranged for supporting the individual platens, manifolds upon the base located at opposite sides of the platens for receiving a heating medium from a source of supply, and a series of pipes slidably mounted in said manifolds having their opposite ends connected with the platens arranged for supplying the heating medium to the platens at different radial portions of the adjacent platens.

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