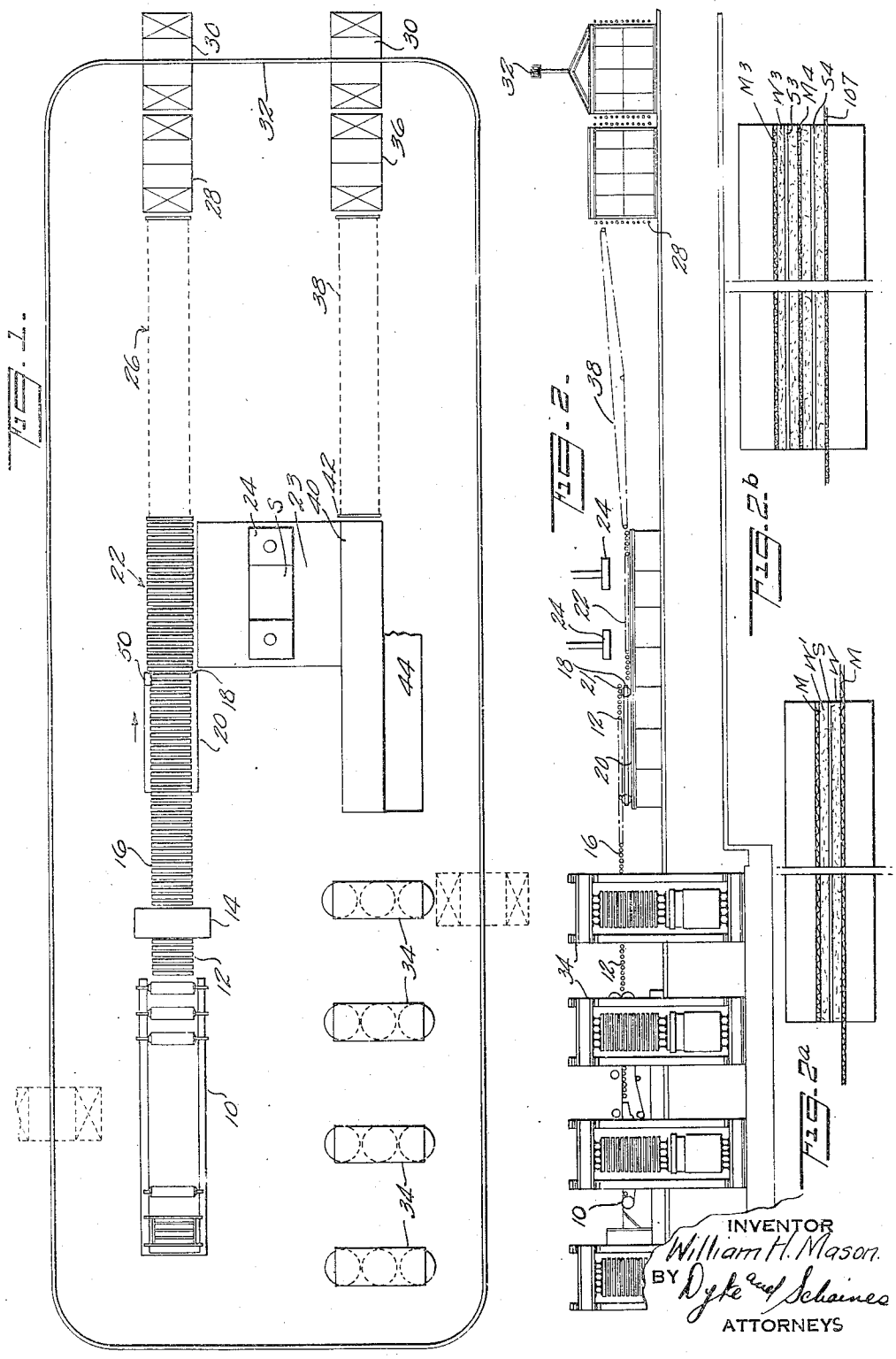
Jan. 17, 1933. W. H. MASON 1,894,778

MULTIPLE FIBER BOARD PRODUCTION

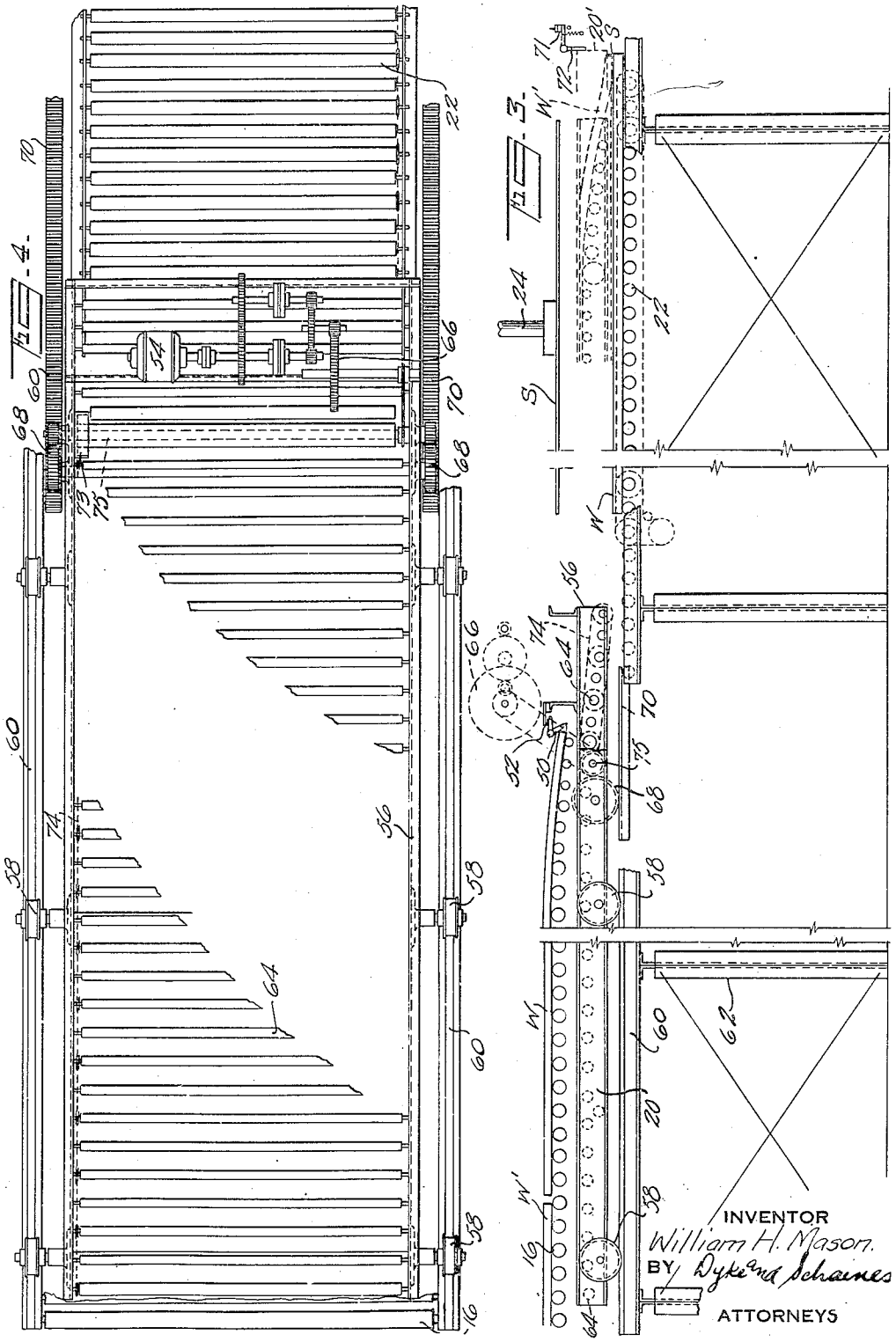
Filed Jan. 23, 1931 5 Sheets-Sheet 1



Jan. 17, 1933. W. H. MASON 1,894,778

MULTIPLE FIBER BOARD PRODUCTION

Filed Jan. 23, 1931 5 Sheets-Sheet 2



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MULTIPLE FIBER BOARD PRODUCTION

Filed Jan. 23, 1931 5 Sheets-Sheet 3

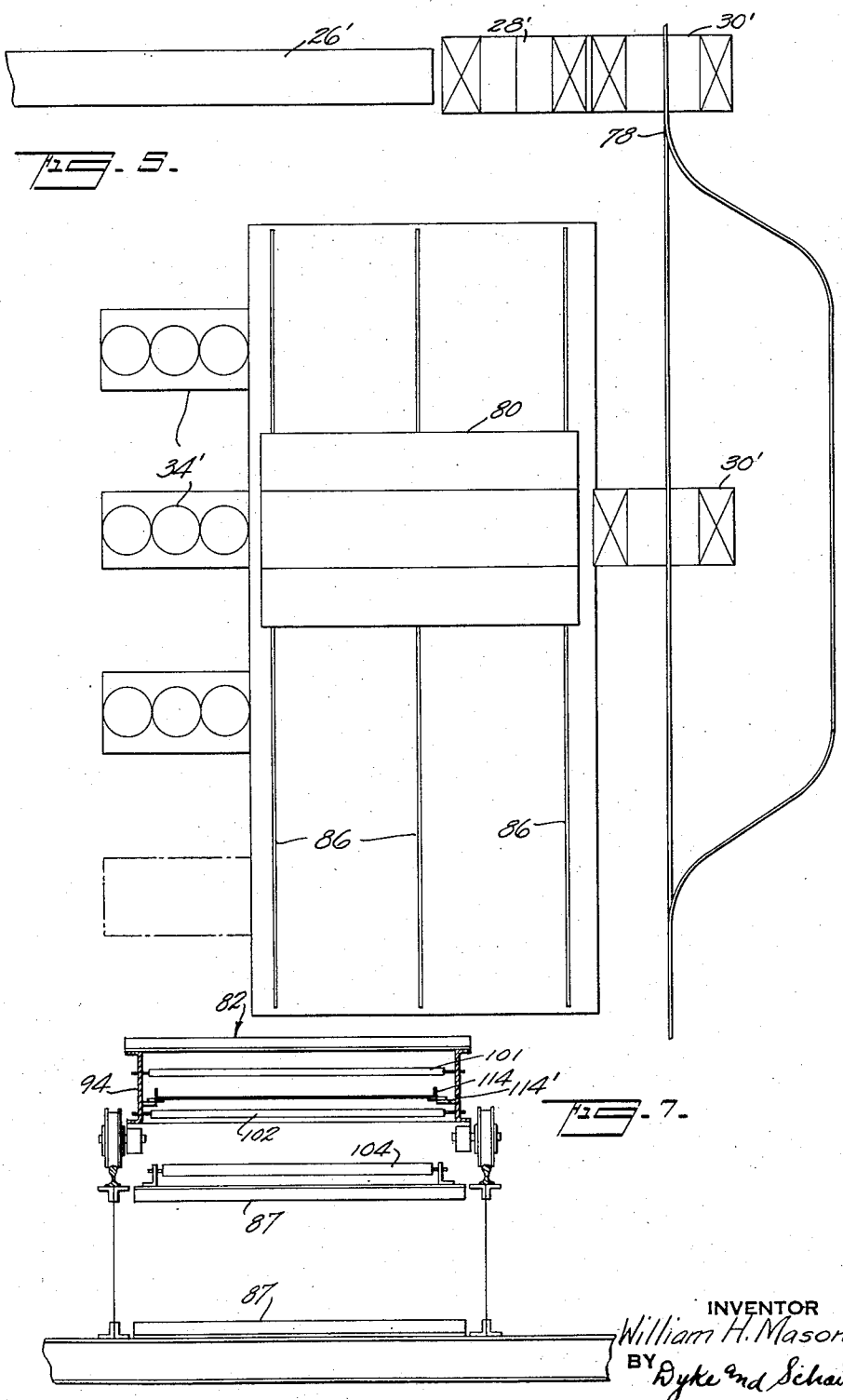


FIG. 5.

FIG. 7.

INVENTOR
William H. Mason.
BY Dyke and Schaines
ATTORNEYS

Jan. 17, 1933. W. H. MASON 1,894,778

MULTIPLE FIBER BOARD PRODUCTION

Filed Jan. 23, 1931 5 Sheets-Sheet 4

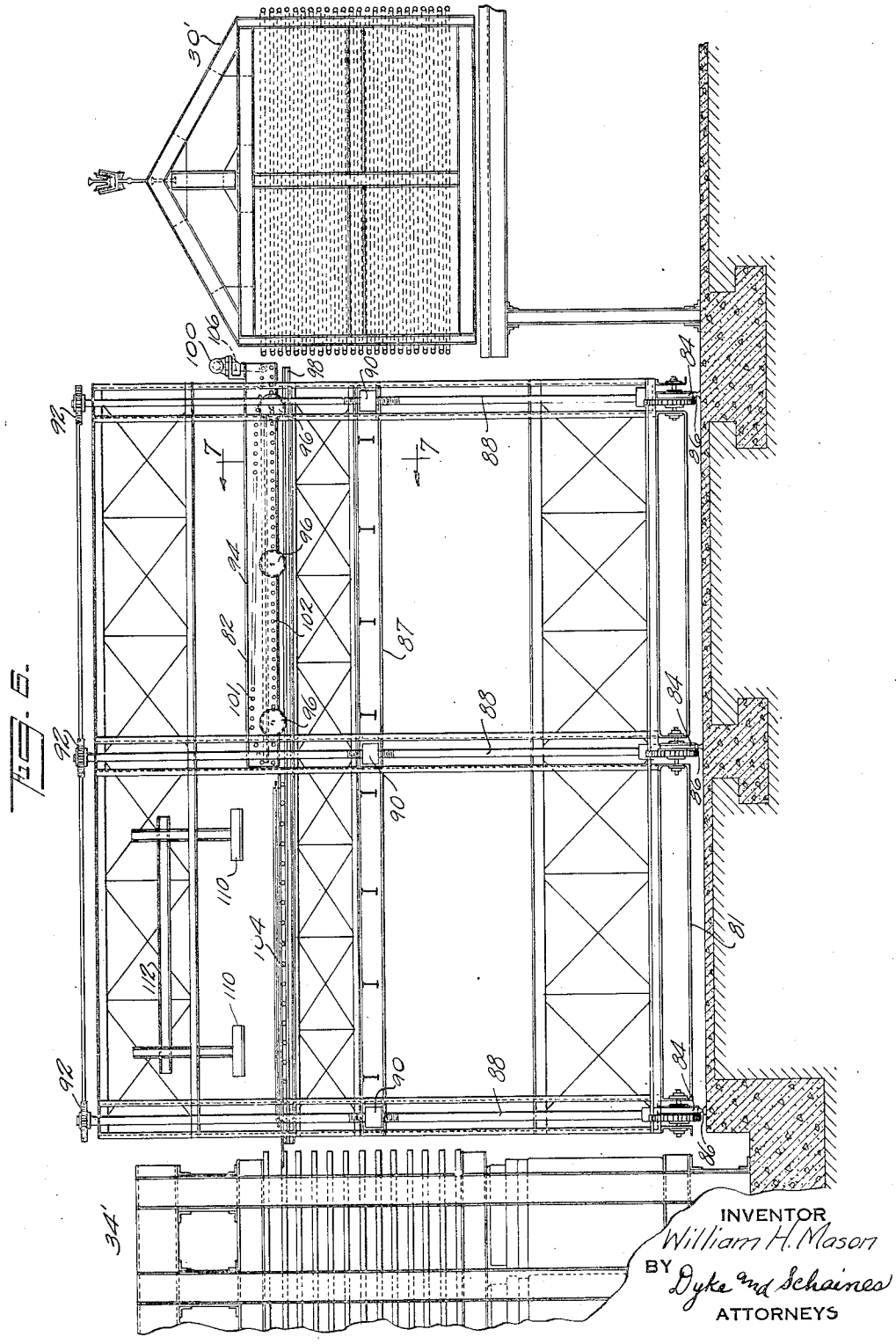
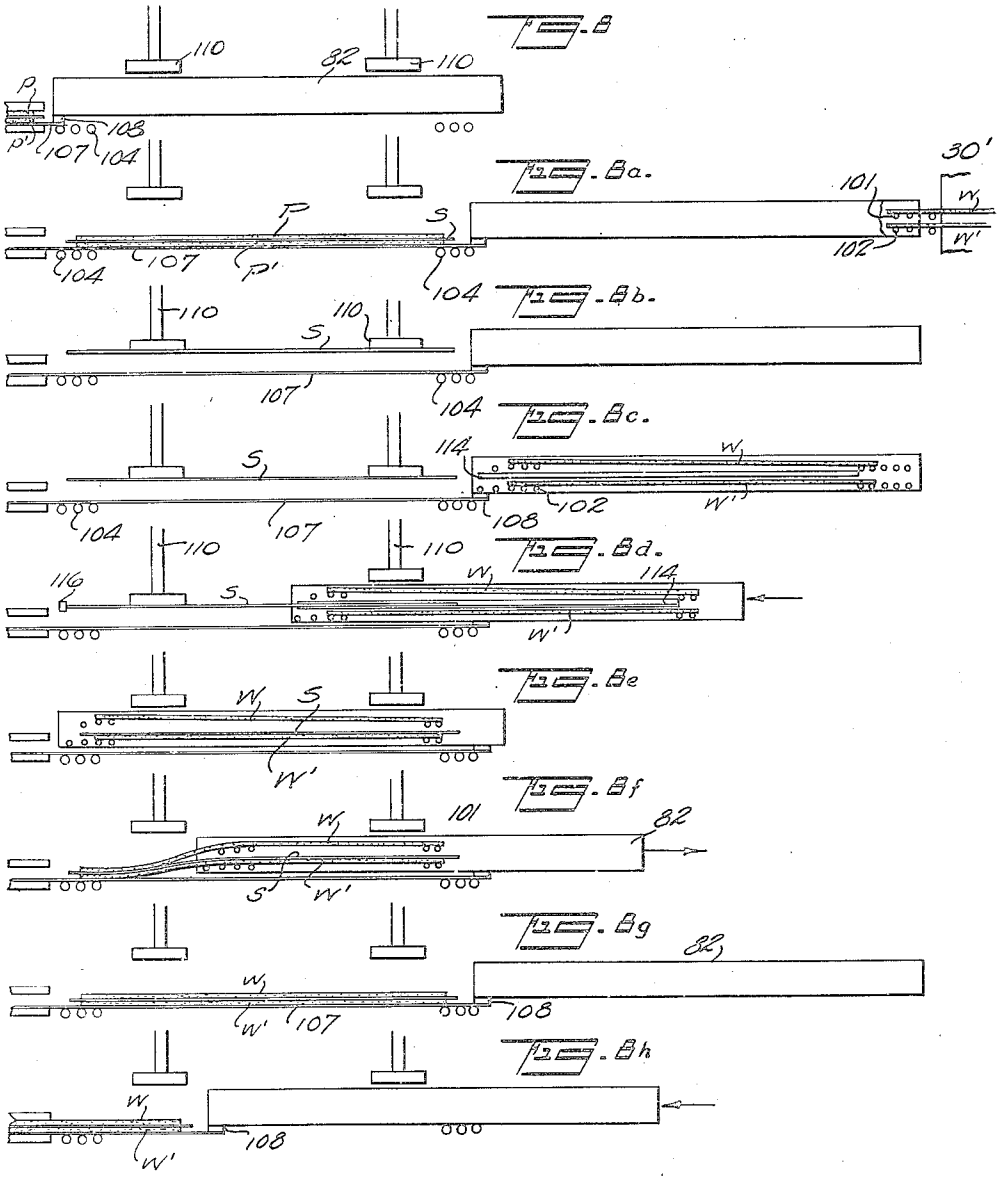


FIG. 5.

Jan. 17, 1933. W. H. MASON 1,894,778

MULTIPLE FIBER BOARD PRODUCTION

Filed Jan. 23, 1931 5 Sheets-Sheet 5



INVENTOR
William H. Mason
BY Dyke and Schaines
ATTORNEYS

Patented Jan. 17, 1933 1,894,778

UNITED STATES PATENT OFFICE

WILLIAM H. MASON, OF LAUREL, MISSISSIPPI, ASSIGNOR TO MASONITE CORPORATION, OF LAUREL, MISSISSIPPI, A CORPORATION OF DELAWARE

MULTIPLE FIBER BOARD PRODUCTION

Application filed January 23, 1931. Serial No. 510,601.

My invention relates to the production of vegetable fiber boards, and is directed more particularly to handling moist, fragile sections of vegetable fiber into a press in multiple formation, and pressing same to produce a plurality of boards in each of the interplaten spaces of the press.

In my U. S. Patent No. 1,767,539 granted June 24th, 1930, I have disclosed a process comprising continuously producing such a sheet of vegetable fiber, cutting same into sections, conveying the sections into superposed independently supported relation in racks having a multiplicity of compartments, transferring the independently supported wet lap sections simultaneously to a press of the superposed multiple platen type, inserting the wet lap sections within the interplaten spaces, and pressing to make vegetable fiber boards.

With the wet lap handling system of my said patent, a single wet lap was ordinarily inserted and pressed in each of the interplaten spaces of the press to make a single board therein, and it was necessary to interrupt the automatic functioning if it were desired to insert in a single interplaten space, and press therein, for example, two wet laps, with a metal matrix or face-forming member or sheet therebetween. With my present invention, I can multiply the output of the press by pressing two, three, or even four boards in a single interplaten space in place of a single board, without the necessity of interrupting the automatic functioning of the system.

According to one form of the invention, the wet lap sections and intermediate face-forming members are piled or sandwiched together at a point between their delivery from the forming and cutting off apparatus, and their insertion into the racks, and are handled in such sandwich form into the stationary rack, into the racks travelling therefrom to the press, and out of the last named racks into the press. Of course, such rack system can be simplified, if for example, a board making plant contains but one press. In such case travelling racks can be eliminated and the sandwiches transferred directly from the stationary rack into an adjacently located press.

According to another form of my invention, I dispense with such preliminary sandwiching, and proceed with the handling of the wet lap sections single and individually, as in my said patent, up to a point immediately preceding introduction into the press, and perform the sandwich formation at that point. With this embodiment of the invention, the piles of wet lap sections and face-forming members upon being made up are put directly into the press, and the racks, both stationary and travelling, handle only single wet lap sections.

Further objects of the invention will appear in connection with the following description of the apparatus selected for the purpose of illustration:

Figures 1, 2, 3 and 4 of the appended drawings illustrate said first embodiment of my invention, and Figures 5, 6, 7 and 8 illustrate the second embodiment thereof. In said drawings

Figure 1 is a diagrammatic plan view of apparatus with which preliminary sandwiching of the wet lap sections is accomplished immediately after leaving the forming and cutting off machine;

Fig. 2 is a diagrammatical side elevation of the parts shown in Fig. 1;

Fig. 2*a* is a transverse sectional view showing a sandwich formation comprising two wet laps and an intermediate face forming member arranged for pressing between press platens.

Fig. 2*b* is a sectional view similar to Fig. 2*a* and showing a multiple sandwich having four wet lap sections with two face forming members and a wire screen member interposed in alternation.

Figs. 3 and 4 are enlarged, respectively side elevation and plan views, with parts broken away, showing the sandwich forming mechanism of Fig. 1, the full line position in Fig. 3 illustrating the wet lap transporting carriage in position for receiving the wet lap, and the dotted lines showing same in position for the discharge of the wet lap;

Fig. 5 is a diagrammatic plan view of the

second or modified form of apparatus above referred to in which the wet lap sections are brought singly before the press, and sandwiched just before introduction between press platens;

Fig. 6 is a detail elevational view, on a larger scale, of the transfer mechanism of Fig. 5;

Fig. 7 is a vertical sectional view taken on the line 7—7 of Fig. 6; and

Figs. 8, *a*, *b*, *c*, *d*, *e*, *f*, *g*, and *h* are diagrammatic views showing the sandwich assembling operations performed during movement of the wet lap transfer carriage of Fig. 6 forward and back between the rack that supplies the wet lap sections and the press.

Referring to Figures 1 to 4 inclusive, the wet lap is produced in a forming machine such as a Fourdrinier machine 10, from which a continuous sheet of the wet lap emerges onto the conveyor 12. The endless sheet is cut into desired lengths at 14 by means of any suitable cut-off mechanism while travelling along the conveyor 12. Beyond the cut-off 14, the sections of wet lap are separated by being carried along faster on the conveyor 16 which terminates at 18.

The wet lap sections are piled into sandwich formation upon leaving the conveyor 16. For this purpose, a carriage 20 advances from beneath the outer end 18 of the conveyor 16, receives a wet lap section W therefrom, and delivers such section on a roller bed 22 as it returns to its position beneath the conveyor 16, ready to receive a second wet lap section W′ for delivery in the same manner.

After the carriage 20 has laid down the first wet lap W on the sandwich forming bed 22, a metal sheet S is lifted from table 23 and laid on the first sheet W, preferably being lifted and dropped by magnets 24, whereupon the carriage 20 moves forward and deposists thereon a second wet lap sheet W′. This three layer sandwich or mass W—S—W′ is then delivered by tipple conveyor 26 to successively elevated, roller-floored compartments in a stationary rack 28, said rack 28 being adapted, when its compartments are completely filled with the sandwiches so formed, for transferring the entire load into a movable rack 30. Movable rack 30 is suspended from a monorail 32 which surrounds the entire operating equipment. Said movable rack 30 is adapted to be moved along said rail 32 to a position in front of one of a number of hydraulic presses 34 of the multiple platen type into which the work is put for pressing. After pressing, the sandwiches P—S—P′ (the fragile, thick wet lap sections W and W′ having been made into strong thin boards P and P′) are transferred back into one of the movable racks 30 and moved to a second stationary rack 36 into which the board sandwiches are all simultaneously transferred, and from which rack 36 the sandwich masses P—S—P′ are delivered successively by means of a second tipple 38 to a receiving table 40, located alongside the table 23 and adjacent to the roller surface sandwich forming station 22. A stripper 42 at the discharge (lower) end of tipple 38 engages the top board P′ thereby stopping its movement, but permitting the lower board P and the chrome plated steel plate S on the surface thereof to pass through and on to the table 40. The top board P′ is taken away from tipple 38, and the metal sheet S is lifted and removed by magnets 24, ready to be placed on new pieces of wet lap W in making sandwich formations on the roller bed 22. This exposes the lower board P, which also is removed, both of the boards P and P′ being preferably dropped down through a chute 44 leading to the trimmer, humidifiers, etc.

The particular driving mechanism for the carriage 20 can take various forms, and is here indicated principally diagrammatically. With the arrangement shown in Fig. 3, and Fig. 4, switch arm 50, being engaged by the wet lap W, closes the switch 52 to complete an electrical circuit to motor 54, Fig. 4, on the carriage 20, which carriage comprises a frame 56 mounted on wheels 58 that run on tracks 60 supported by legs 62. The wet lap supporting means of carriage 20 preferably comprise a series of rollers 64 supported in the frame 56.

The motor 54, through gear and sprocket reduction train 66 drives a pair of gears 68 to drive the carriage 20 by engagement with a stationary rack 70. As the carriage 20 advances, the wet lap W is received from the conveyor 16 upon the rollers 64 of said carriage 20, and by the time that the entire wet lap section W has been deposited on the carriage 20, said carriage 20 will have advanced to the limit of its forward movement, as indicated in dotted lines at 20′, Fig. 3, whereupon an electrical contact is made at 71 by engagement of the carriage 20 with the contact arm 72 to cause the movement of motor 54 and the carriage 20 to be reversed. During the return movement of said carriage 20, a ratchet, clutch or the like 73 is automatically operated to throw the sprocket drive 74 for the carriage rollers 64 into engagement with the main drive shaft 75, thereby causing said rollers 64 to rotate and discharge a sheet of wet lap W on the roller bed 22 provided to support same during sandwich formation.

After the carriage 20 has returned, a metal sheet S is taken from table 23, either manually or automatically, and placed on the surface of the wet lap W supported on rollers 22. One means of automatically handling the metal sheets is by means of electro-magnets shown diagrammatically at 24.

Upon movement of the next wet lap section

into engagement with the switch arm 50, the forward movement of said carriage 20 is repeated, as already described, to place a second wet lap W′ on top of the metal sheet S. A two layer wet lap unit with a metal sheet between is thus formed, which is next conveyed to the tipple 26, which transfers each unit to roller conveyor compartments in the stationary rack 28 and from there to the movable racks 30 and press 34, then back to a movable rack 30, second stationary rack 36 and second tipple 38 to the receiving station as described.

By a variation of this same method a sandwich formation comprising more than two wet laps can be formed. All that is required is to have the carriage 20 continue its reciprocating movement to transfer the required number of wet lap sections and to have the metal sheet members placed between the sections of wet lap, the number of layers being, of course, limited by the space available between press platen.

With a simple sandwich formation consisting of wet laps W, W′ and interposed face forming sheet S, the moisture can be driven off through upper and lower press platen screens M, M, Fig. 2*a*. When more than two layers of board are formed, alternate metal plates and metal screens are interposed between said layers, so as to always have a screen on one surface and a flat plate on the other surface of each wet lap, the purpose of the screen being to provide a means for allowing water and moisture to escape.

In Fig. 2*b* I have shown a sandwich formation comprising four layers of wet lap interposed between two press platens. It will also be observed that the upper layer of wet lap W3 has a mesh member M3 engaging its upper surface, which can either be placed on top of the upper wet lap layer W3 or attached to the under surface of the upper platen, and the same can be done at the bottom through the bottom mesh, hereafter indicated as 107, which is preferably associated with the press platen to act as a means for conveying the sandwich into the press. The several wet laps have face forming members S3 and S4 and wire mesh members M4 alternately arranged between them.

With the alternative method illustrated in Fig. 5 and following, with which the wet lap sections are handled separately until put into sandwich formation as they are about to enter the press, I again (see Fig. 1) make use of a Fourdrinier machine 10, a conveyor 12, and an automatic cut off 14. Instead of forming layers by means of the carriage 20, the wet laps are transferred successively and singly direct to the stationary rack 28′ by means of the tipple 26′, indicated in Fig. 5, and from the stationary rack 28′ they are transferred simultaneously to the movable rack 30′ which is moved along a monorail 78 to a position opposite a row of presses 34′, but spaced away therefrom to make room for the sandwich forming and transfer device 80 which takes the wet lap sections from the movable rack 30′, puts them into sandwich formation, and delivers the sandwich to the press and also unloads the boards from the press.

Transfer and sandwich forming apparatus 80 comprises a frame 81 for supporting a layer forming carriage 82. Said frame 81 is mounted on wheels 84 which are guided along tracks 86 positioned between the row of presses 34′ and the movable rack 30′.

The carriage 82 is mounted on a platform portion 87 of frame 81 which is supported on vertically disposed screw threaded shafts 88 by bearings 90 secured to the platform 87. Said screw shafts are adapted to be rotated by means of worm gear drive members 92 to raise or lower the platform 87.

The carriage 82 comprises a housing member 94 mounted on wheels 96 which are guided on tracks 98 extending the full length of the platform structure 87, and is adapted to be driven forward towards the press and backward by means of a motor drive 100 or in any other suitable way. To control the direction of travel a switch or mechanical clutch (not shown) may be used. Upper and lower conveyors 101 and 102 are mounted within the housing 94 and are adapted to be driven intermittently by any suitable means such as by a sprocket and chain drive 106, connected to the driving shaft of the motor by a clutch or any other suitable way which could be controlled either manually or automatically. A roller platform 104 is supported on the platform structure 87 to provide a roller surface over which the platen screens 107 are adapted to be drawn.

The layer forming is accomplished by means of the reciprocating carriage 82, which is adapted to withdraw finished boards from the press and transfer wet laps with a metal sheet between, from the rack to the press.

For convenience of the description of operation, we will assume that the press 34′ has completed the pressing operation of a load of boards, and the carriage is in the position shown as in Fig. 8, the first figure of a series of views illustrating the various operations in the unloading and the forming of new layers with metal sheets between and loading said layers into the press.

The carriage 82 is attached to one end of a platen screen 107 by means of attaching member 108. When the press platens are opened, after the completion of a pressing operation, the carriage 82 is moved back toward the rack 30′ (see Fig. 8*a*) withdrawing the screen 107 and the sandwich thereon consisting of pressed boards P, P′ and metal sheet S between said boards, to the position shown in Fig. 8*a*, the screen with its load of boards and plates being supported by the rollers 104.

The upper board P is removed manually or otherwise, leaving the metal sheet S exposed. Directly above the metal sheet there are two electro-magnetic members 110, suspended from a suitable support 112, which are adapted to be raised and lowered. Both magnets are lowered together until they about engage the metal sheet S whereupon the magnets are energized and the metal sheet S is attracted. The magnets and metal sheet are then raised slightly to permit the lower board P′ to be removed, thus leaving the parts in the position shown in Fig. 8*b*.

While the pressed boards P, P′ were being removed, the conveyor rollers on the movable rack 30′ in alignment with the carriage rollers 101, 102, were set in motion as shown in Fig. 8*a*, and delivered two wet laps to the carriage 82, the wet laps being shown after such delivery in Fig. 8*c*.

The screen 107 supported on the rollers 104 is disengaged from the carriage 82 at 108, and the carriage 82 is now driven forward as shown in Fig. 8*d*, the conveyor screen 107 remaining in stationary position on the rollers 104. Two supporting shelves 114 project inwardly from the said wall members of carriage housing 94, and are positioned so that they will come under the side edges of the metal sheet S (See Fig. 7) to support said sheet while the carriage 82 is moving forward. After the carriage 82 moves forward a short distance, the magnet 110 nearest the carriage 12 deenergized and raised out of the path of the carriage housing 94 (Fig. 8*d*) leaving the end of the sheet S released thereby to be supported by the shelves 114. The second magnet retains its hold on the metal sheet S until the carriage approaches it, whereupon the second magnet is deenergized and raised (Fig. 8*e*), leaving the sheet S entirely supported by the shelving 114. A movable abutment 116 is brought into engagement with the end of said metal sheet S nearest the press to hold the sheet S stationary while the carriage continues to the end of its forward movement. The shelves are next moved outwardly on their supporting brackets 114′ in housing 94 of carriage 82 out of engagement with the metal sheet, to permit the sheet S to drop upon the upper surface of the lower wet lap W′, in which position sheet S is shown in Fig. 8*e*.

Both sets of carriage rollers 101, 102 are set in motion to drive both wet laps W, W′, and metal sheet S, off from the surfaces thereof (Fig. 8*f*) and at the same time, the carriage 82 moves rearwardly, as indicated by the arrow on Fig. 8*f*, toward the movable rack 30′, thereby causing the carriage to move away from the wet laps, as they are being discharged is indicated at the left hand side of Fig. 8*f*.

After carriage 82 returns to the rearward position shown in Fig. 8*g*, the screen 107 is again attached to the carriage 82 at 108 and the carriage 82 is driven forward toward the press again, pushing the screen with the wet laps and metal sheet thereon into the press, as in Fig. 8*h*. Tractive means may be supplied to the mesh sheet 107 at the forward end thereof (not shown) to draw the mesh sheet 107 with its load into the press.

When the limit of this forward movement is reached, the carriage 82 is disengaged at 108 from the screen 107.

Assuming the foregoing unloading and loading operations as having been started at the top press platen, as shown in Fig. 6, the platform 87 is lowered by means of screws 88 on the frame 81, to bring the carriage 82 into operative alignment with the next lower platen screen. The operations of unloading and loading are repeated as previously described until the entire press is reloaded with wet laps, after which the press platens are brought together to press said wet laps into boards, there being half as many interplaten spaces in the press as in the movable rack 30′ in case the sandwich formations are of the simplest type comprising two wet laps with an intermediate face forming sheet between them.

I claim:

1. The method of producing fiber boards in multiple which comprises superposing wet lap sections of vegetable fiber in sandwich formation with a face forming member therebetween, transferring same to a press, and pressing.

2. Method of producing multiple pressed boards of vegetable fiber in sandwich formation with face forming members therebetween, which comprises supporting a series of such sandwich formations independently in superposed relation, transferring same in such relation to a press, inserting the respective sandwich formations between respective press platens, and pressing.

3. Process of producing pressed boards of vegetable fiber in multiple which comprises superposing sections of wet lap of vegetable fiber with face forming members therebetween, transporting such sandwich formations successively into superposed independent relation, transferring said sandwich formations simultaneously into position before a press, inserting said sandwich formations simultaneously between platens of the press, and pressing.

4. Process of producing pressed boards in multiple which comprises superposing sections of wet lap of vegetable fiber with face forming members therebetween, transporting such sandwich formations successively into superposed independent relation, transferring said sandwich formations so supported simultaneously into position before a press, inserting said sandwich formations

simultaneously between platens of the press, pressing, removing the sandwich formations after pressing simultaneously from the press, transporting same simultaneously away from the press, separating the pressed boards from the face forming plates successively for successive sandwich formations, and transferring the face forming members into position between new wet lap sections.

5. Process of producing pressed vegetable fiber boards in multiple between the platens of a press, which comprises forming wet lap sections, supporting said wet lap sections individually in independent superposed relation, transferring same so supported to the press, there forming the sections into sandwiched relation with interposed face forming members, and inserting such sandwich formations between the press platens and pressing.

6. Process of producing pressed vegetable fiber boards in multiple within individual interplaten spaces of the press, which comprises forming wet lap sections, supporting said wet lap sections in superposed independent individual relation, transporting same in such relation, forming same into sandwich formations with interposed face forming members immediately in front of the press, inserting the sandwich formations so produced into the press, and pressing.

7. Process of producing multiple pressed boards of vegetable fiber, which consists in producing wet lap sections of the fiber, moving same sucessively into superposed independently supported individual relation, conveying the wet lap sections in such relation toward a press, forming the wet lap sections with interposed face forming members into sandwich formation immediately in front of the press, inserting the sandwich formations so produced into the individual interplaten press spaces, and pressing.

8. Apparatus for producing sandwich formations of vegetable fiber wet laps with interposed face forming members, which comprises a conveyor for conveying the wet lap sections to the point where the sandwich formation is to be produced, and a reciprocating carrier moving out from under the conveyor for receiving the wet laps from the conveyor and moving under the conveyor while delivering the wet laps to the station for sandwich forming.

9. Loader and unloader for press comprising a reciprocating carriage adapted to be moved back and forth between a wet lap rack and a press, and comprising means for taking a plurality of individually supported wet laps from the rack and putting same into superposed sandwich formation with a face forming member therebetween, and means cooperating therewith for inserting such sandwich formation within an interplaten space of the press.

10. Press loading apparatus comprising a reciprocable carriage, means associated with said carriage at one end of its travel for moving individually supported wet laps into said carriage to be supported therein, means operating during a portion of the reciprocating travel of the carriage for introducing face forming members between the wet laps carried thereby, and means operative at another stage of the reciprocating movement of the carriage for delivering sandwich formations comprising wet laps and interposed face forming members within the interplaten spaces of the press.

11. A multiple platen press, supply means adapted to be positioned opposite said press for supporting a plurality of wet laps of vegetable fiber individually in independent superposed relation, and reciprocable means interposed between said press and said supply means for removing a plurality of wet lap sections from said supply means, inserting sheets of face forming material therebetween, and introducing the sandwich formations thus produced into the independent interplaten spaces of the press, whereby a plurality of vegetable fiber boards are pressed in individual interplaten spaces.

12. The combination with a press and supplying means for individually supporting a plurality of wet lap sections in superposed independent relation, of a carriage mounted for reciprocation between said press and said supply means, means associated with said carriage for withdrawing work from the press after the press is opened, electro-magnetic means adapted to lift metallic face forming members when the work is withdrawn from the press, means for delivering a plurality of wet laps from said supporting member to a supporting means within said reciprocating carriage, withdrawable shelf means in said reciprocating carriage to receive and support the metallic face forming member between the wet lap sections when released by the electro-magnetic supporting means and upon withdrawal to let the face forming means drop on to the lower wet laps, said carriage being adapted to deliver a sandwich formation so produced and comprising a plurality of wet laps and an interposed metallic face forming member into an individual interplaten space within said press for pressing a plurality of boards in single interplaten press spaces.

13. The method of claim 1 in which one of the wet lap sections is fed on to a moving carriage which is then stopped and reversed, the wet lap section being removed from said carriage during reversal and deposited upon a support, the face forming member being thereupon placed upon the wet lap section and a second wet lap section fed onto the moving carriage and thereafter deposited upon the face forming member in the manner

by which the first section was deposited upon the support.

14. The method of claim 1 in which a plurality of wet lap sections are fed on to superposed supports of a movable carriage, said carriage being moved and causing the face forming member to enter the space between the wet lap sections, the carriage being then reversed and simultaneously depositing upon a support the wet lap sections and face forming member in sandwich formation.

15. The apparatus of claim 9 in which the reciprocating carriage is mounted for movement upon a support having vertical movement to permit the carriage to receive wet laps and deliver sandwich formations at different levels.

16. The apparatus of claim 9 in which the means for inserting the sandwich formation within the interplaten space of the press comprises a screen movable into and out of said interplaten space.

In testimony whereof, I have signed my name hereto.

WILLIAM H. MASON.