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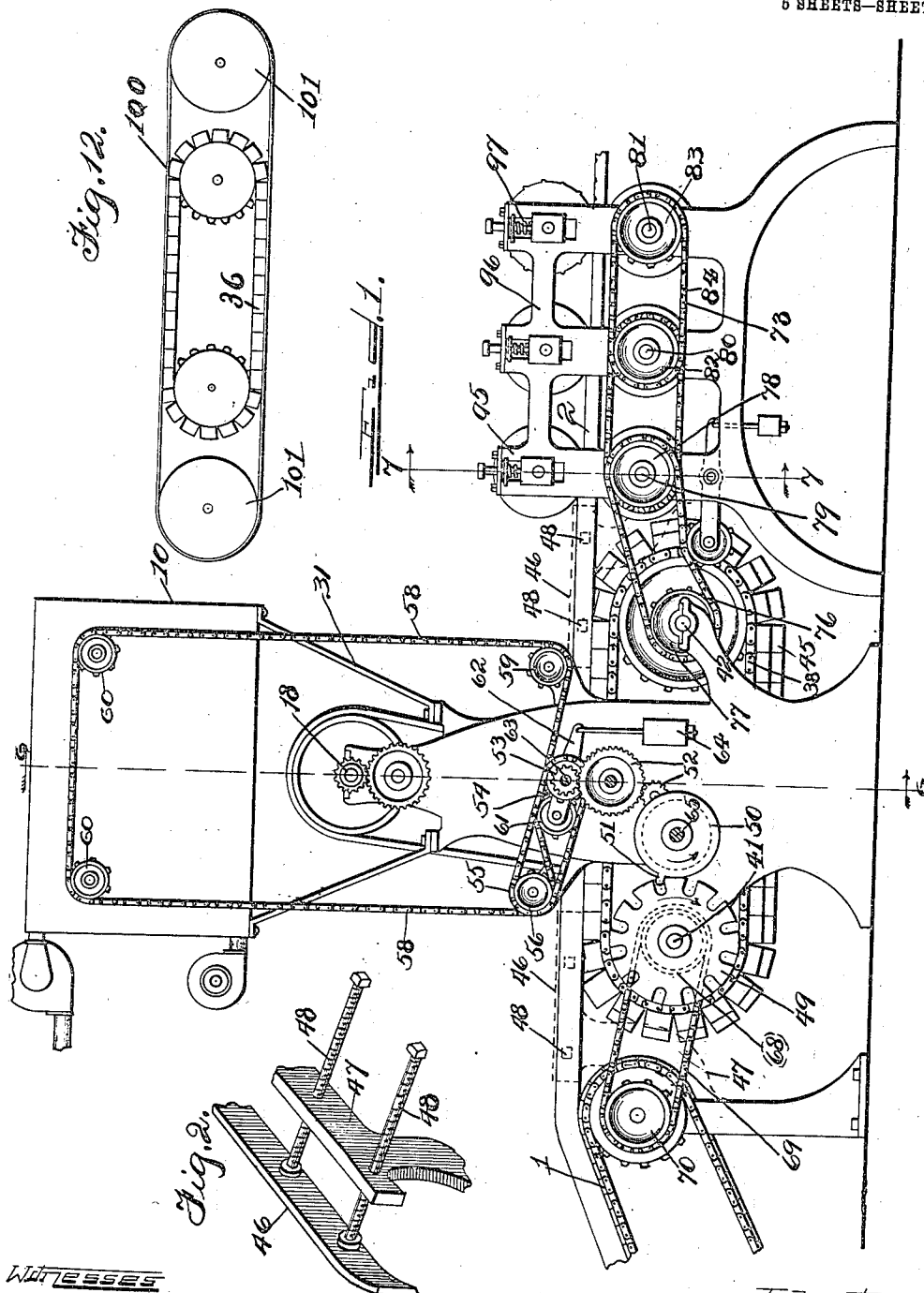
PATENTED AUG. 2, 1904.

T. W. McFARLAND.
MACHINE FOR MAKING PAPER BOARD.

APPLICATION FILED FEB. 3, 1902.

NO MODEL.

5 SHEETS—SHEET 1.



WITNESSES

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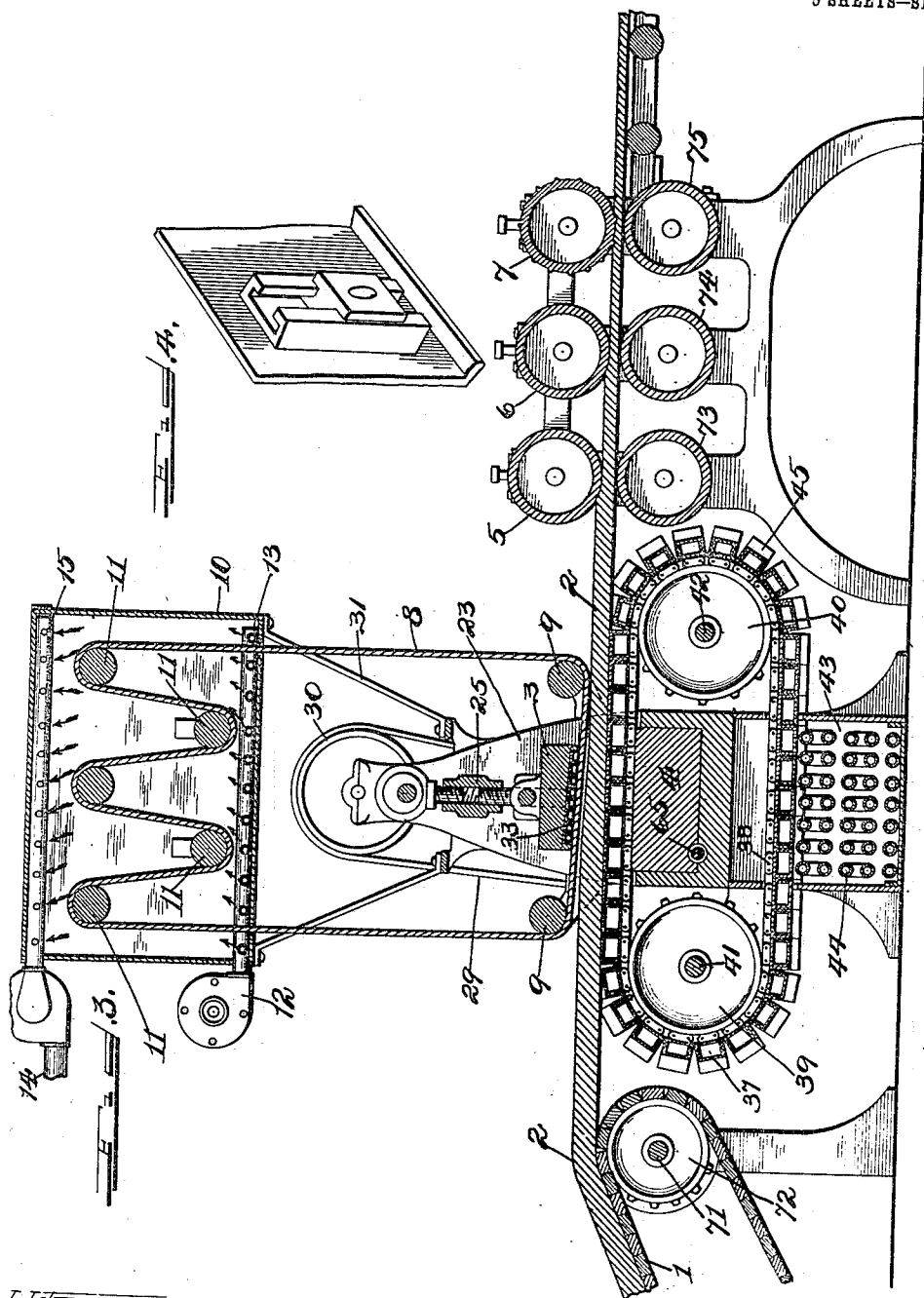
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5 SHEETS—SHEET 2.



WITNESSES

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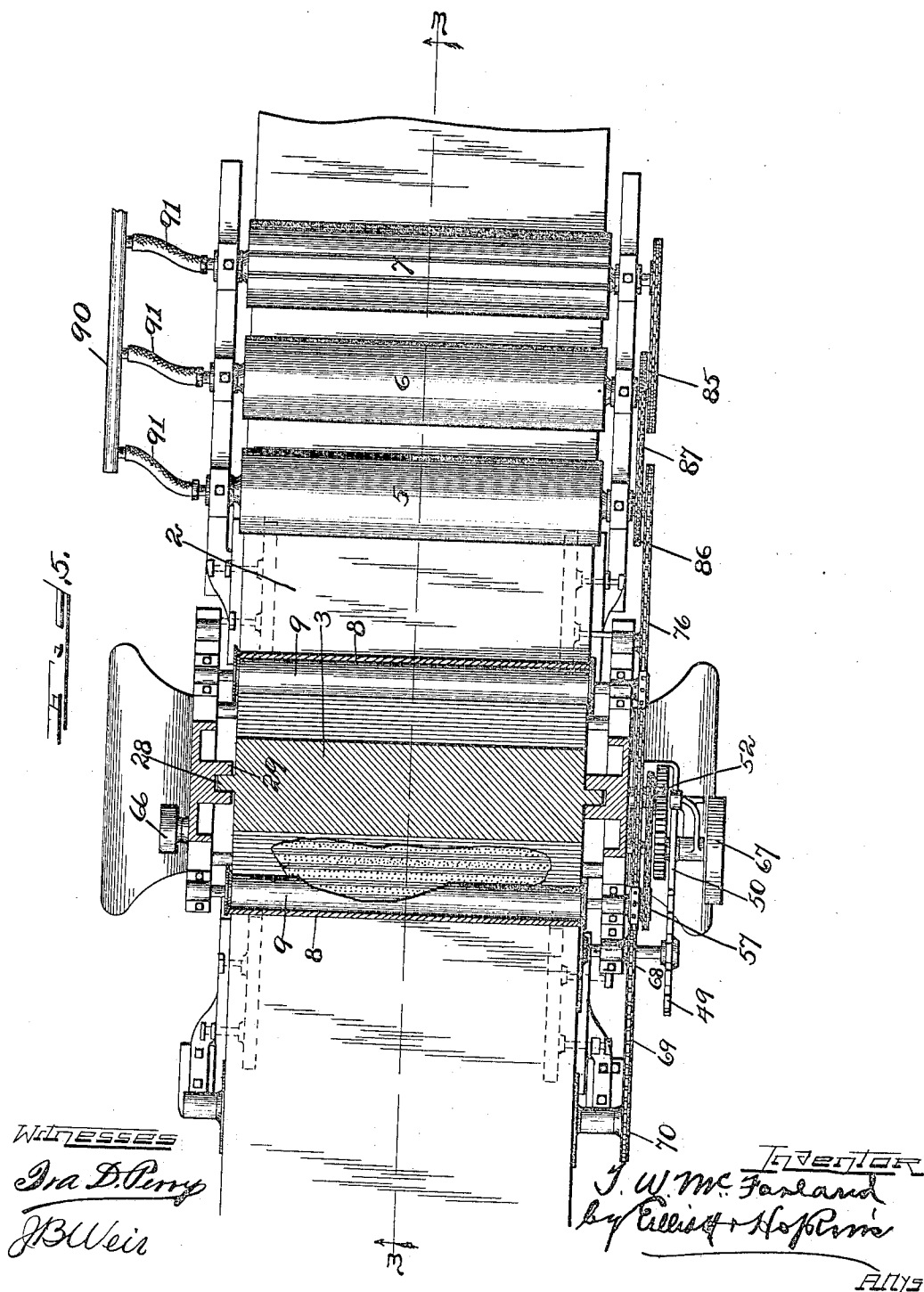
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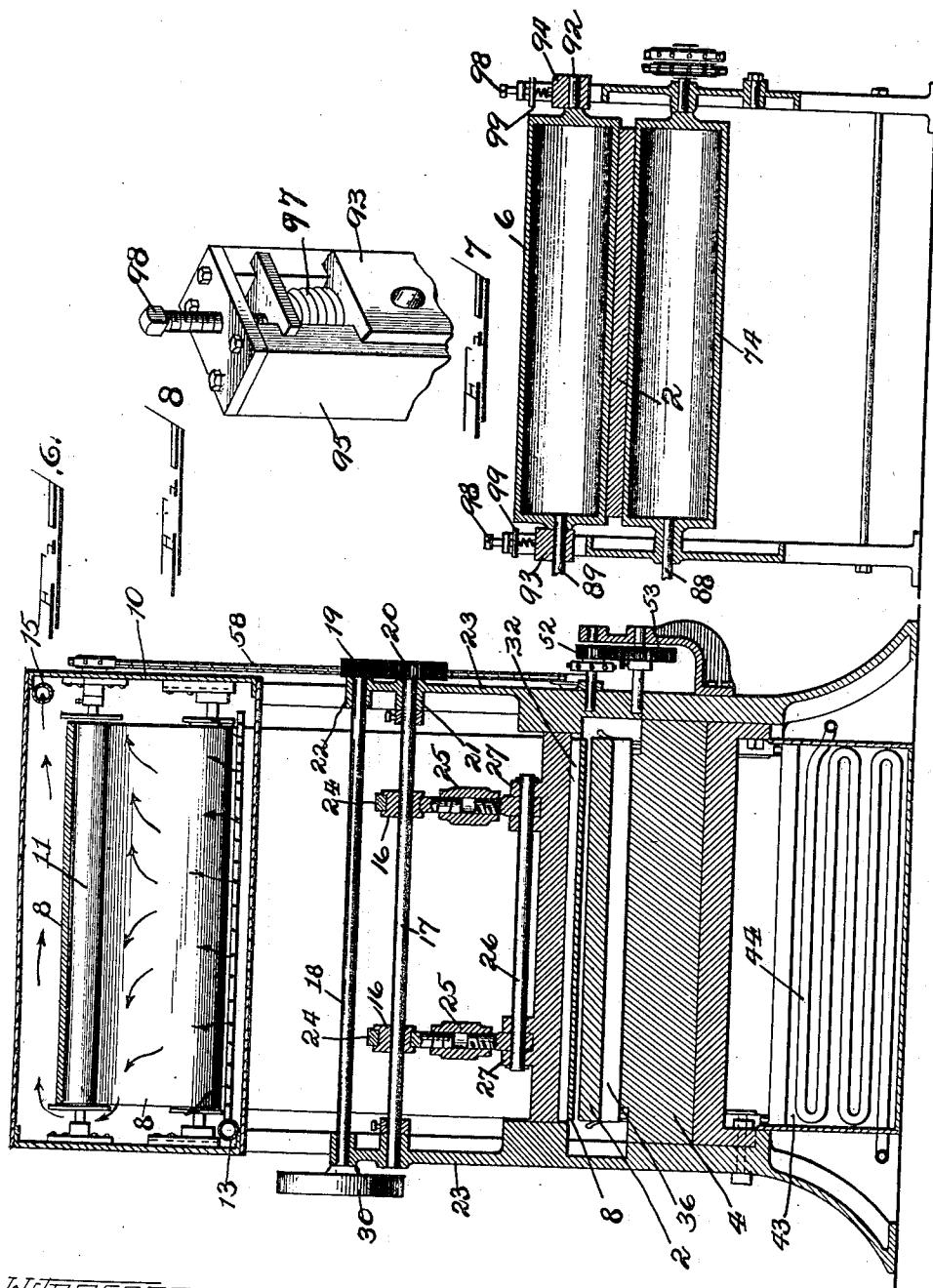
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5 SHEETS—SHEET 4.



WITNESSES

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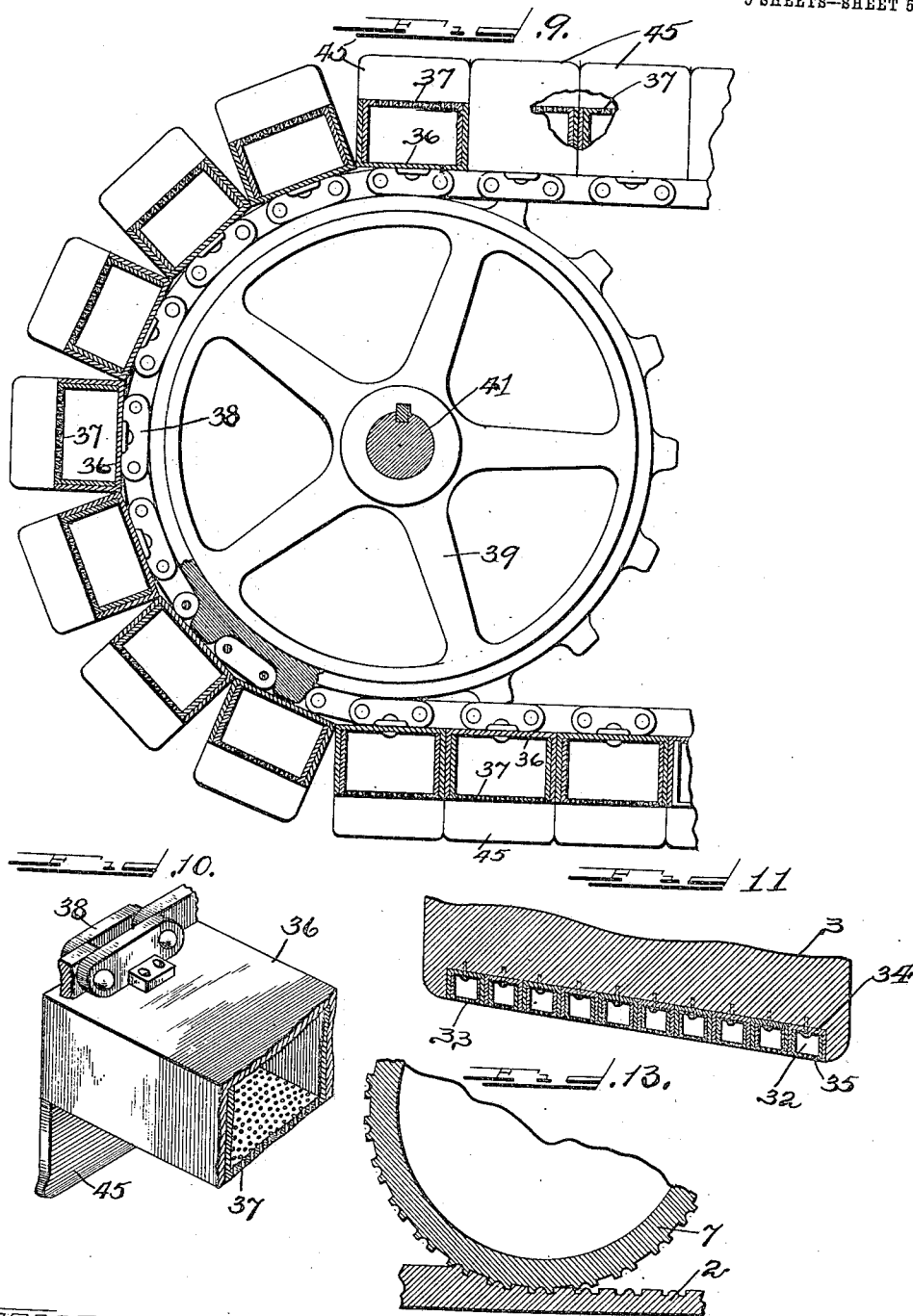
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NO MODEL.

5 SHEETS—SHEET 5.



WITNESSES
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UNITED STATES PATENT OFFICE.

THOMAS W. McFARLAND, OF CHICAGO, ILLINOIS.

MACHINE FOR MAKING PAPER-BOARD.

SPECIFICATION forming part of Letters Patent No. 766,461, dated August 2, 1904.

Application filed February 3, 1902. Serial No. 92,260. (No model.)

To all whom it may concern:

Be it known that I, THOMAS W. McFARLAND, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Making Paper-Board, of which the following is a full, clear, and exact specification.

My invention relates more particularly to means for producing heavy paper-board; and it has for its primary object to produce strips of heavy board by a continuous operation and of indefinite length.

With these ends in view my invention consists in certain features of novelty in the construction, combination, and arrangement of parts by which the said object and certain other objects hereinafter appearing are attained, all as fully described with reference to the accompanying drawings, and more particularly pointed out in the claims.

In the said drawings, Figure 1 is a side elevation of a part of my improved apparatus, the mechanism for placing the board in the drying-holder being broken away. Fig. 2 is a detail perspective view of one of the adjustable side guides hereinafter described. Fig. 3 is a vertical longitudinal sectional view taken on the line 3 3, Fig. 5. Fig. 4 is a detail perspective view of one of the adjustable bearings for the presser-foot hereinafter described. Fig. 5 is a plan view of the machine as shown in Figs. 1 and 3. Fig. 6 is a vertical transverse sectional view taken on the line 6 6, Fig. 1. Fig. 7 is a transverse sectional view taken on the line 7 7, Fig. 1. Fig. 8 is a detail perspective view of one of the adjustable bearings for the pressure-rolls hereinafter described. Fig. 9 is an enlarged detail vertical sectional view of the segmental conveying and drying belt hereinafter described. Fig. 10 is an enlarged detail perspective view of one of the segments or sections of said belt. Fig. 11 is a vertical-transverse sectional view of the presser-foot, hereinafter described, partly broken away. Fig. 12, Sheet 1, is a diagrammatic illustration of a modified form of conveying and drying belt and Fig. 13 is a transverse sectional view of a part of an embossed roller to be utilized as

a substitute in some cases for the presser-foot hereinafter described.

The green paper board or pelt is delivered to this machine for undergoing the necessary treatment to convert it into a solid cured board of the requisite thickness and density directly from its source of production by any suitable means, such as a conveyer 1, whose upper fold is driven toward this machine for feeding the green board, which is shown at 2, between a presser-foot 3 and an anvil or support 4, over which the presser-foot is arranged in such a manner as to squeeze the board as the latter is advanced, it being advanced intermittently in any suitable way, and thus remove therefrom the greater part of the moisture and impart to the green board its initial compression, after which it is gradually reduced to the desired thickness and density and also more or less calendered by a series of heated rolls 5 6 7, one or more of which may be embossed with any figures or ornamentation that it may be desired to impart to the finished board. In the present example of the invention the roller 7 is illustrated as an embossing-roller.

In order that the presser-foot 3 may compress the board gradually and avoid the formation thereon of an abrupt shoulder, which would result from pressing into the face of the board and surface arranged parallel therewith, the face of the presser-foot is formed on an incline, as better illustrated in Figs. 3 and 11, with the lower end of the incline toward the thinner part of the board.

The moisture squeezed out of the board on the upper side by the pressure of the foot 3 is absorbed in part by an absorbent belt 8, composed of canvas, felt, cloth, or any other suitable material capable of taking up the water or moisture. As shown in Fig. 3, this belt passes under the presser-foot 3 substantially parallel with the face thereof and under two rollers 9, arranged on either side, and from these rollers it ascends into a drying-chamber 10, wherein it passes around a number of idlers 11, employed for the purpose of prolongating the stay of the belt within the drying-chamber, and thus affording greater opportunity for the moisture carried by the belt

to be evaporated and drawn off. This evaporating process is aided by a blast of injected air supplied from a fan or blower 12 and a series of perforated pipes 13, connected therewith and discharging into the bottom of the drying-chamber, the air, if desired, being heated, and the evaporated moisture is drawn off by an exhauster 14, connected with the interior of the drying-chamber by means of a series of perforated pipes 15, located in the upper part thereof, the perforated pipes 13 15 being disposed at various points throughout the length of the chamber, so that all parts of the belt within the chamber will be subjected to the drying action of the air. The two lower idlers 11 may be made adjustable, if desired, so as to take up slack in the belt.

The presser-foot 3 is raised and lowered at intervals timed suitably with the advancing movement of the board 2 by any suitable means, such as a pair of eccentrics 16, secured to a counter-shaft 17, which is driven from shaft 18 by pinion 19 and gear 20, said two shafts 17 18 being mounted in suitable bearings 21 22, respectively, in standards 23, formed on the main frame of the machine. The eccentric-straps 24 are connected by turnbuckles 25 to a pivot-rod 26, secured in suitable lugs 27 on the upper side of the presser-foot 3, so that the initial elevation of the presser-foot may be regulated to suit the thickness of board being treated. The ends of the presser-foot are provided with tongues 28, which run into guides 29, formed on the inner faces of the standards 23, so as to confine the movement of the presser-foot strictly to the perpendicular and hold its face from changing the angularity of its inclination with relation to the face of the board. The shaft 18 may be driven by belt 29 and pulley 30.

The standards 23 may be utilized for supporting the heated drying-chamber 10, which is arranged above pulley 30 on suitable legs 31, secured to the standards 23.

In order that the moisture squeezed out of the green board and the belt 8 immediately under the presser-foot 3 on the upper side of the board may be taken care of and prevented in a large degree from being reabsorbed by the board, the face of the presser-foot 3 is provided with a number of longitudinally-arranged air-passages 32, whose lower sides are perforated, as shown at 33, Fig. 11, whereby the water squeezed upwardly will escape into the passages 32 and have opportunity to drain off at the ends thereof while the pressure is on, the ends of the passages being open, as shown in Fig. 6. These air-passages are constituted, preferably, by separate channel-bars 34 35, arranged one within the other with their open sides opposed, so as to constitute a complete channel; but any other suitable method of construction may be resorted to.

In order that the water and moisture

squeezed out of the board by the pressure of the presser-foot 3 on the under side may be taken care of and prevented from being reabsorbed by the board when the pressure is relieved, the board is supported during such pressure directly upon a ventilated conveyer running over and resting on the anvil 4 and being preferably composed of a series of hollow segmental bars or sections 36, which have flat outer surfaces and when passing over the anvil 4 constitute a continuous unbroken surface for receiving the pressure of the board and imparting to the latter a substantially smooth finish, the water squeezed out of the board escaping into the hollow bars 36 through fine perforations 37 in the upper sides thereof. The hollow bars 36 are individually secured to the links 38 of a pair of continuous chains or belts passing horizontally around sprockets 39 40, mounted upon transverse shafts 41 42, which are journaled in the main frame of the machine. Located under the anvil 4 is a drying-chamber 43, provided with heating-coils 44 for drying the conveyer comprising the hollow bars 36 as it passes through the drying-chamber 43 in the manner illustrated in Fig. 3, thus driving off any lingering drops of water or moisture that may remain in the bars 36 after descending out of the way of the board.

The conveyer comprising the hollow bars 36 is provided at each side with guide-flanges 45, which support the edges of the board and prevent the compression produced by the presser-foot 3 from mashing the edges out of shape. These guide-flanges are preferably formed on each end of each of the hollow bars 36, as shown in Fig. 10, and when the bars are together during their passage across the anvil 4 the flanges 45 also come together and constitute a continuous flange, as better shown in Fig. 9. The green board is fed or guided between the flanges 45 by means of guides 46, which are adjustably secured to side members 47 of main frame by means of screws 48, (see Figs. 1 and 2,) so that the guides may be set farther apart or closer together to accommodate various widths of board.

The lower conveyer just described is advanced intermittently in the direction of movement of the board a distance equal to the entire or a portion of the width of the presser-foot 3, as may be desired; but the belt 8 is preferably advanced in the opposite direction, so that the wet portion of the belt will move away from the dry portion of the board. These intermittent movements of the conveyer and belt 8 may be produced from the main shaft 17 or from any other suitable source of power by any suitable mechanism—such, for example, as a notched-wheel 49 on the outer end of shaft 41, and a pin-wheel 50, having pin 51 engaging in one of the notches of wheel 49 at every revolution, said pin-wheel 50 being driven by a suitable train of gears 52, deriving motion

from a pinion 53, which is secured to a sprocket 54, connected by short belt 55 with sprocket 56 on one of the rollers 9, which roller 9 is provided with a second sprocket 57, (see Fig. 5,) deriving motion from a belt 58, which passes under sprocket 57 and also under sprocket 59 on the other of said rollers 9 and thence upwardly over two sprockets 60 on the outer ends of the two upper outer rollers 11, thus imparting motion to the latter rollers for assisting in driving the driving-belt 8 in the opposite direction of the line of movement of the board. The slack in the chain belt 58 may be taken up by a belt-tightener comprising an idle sprocket 61, journaled in one end of an arm 62, which is pivoted on stud-shaft 63, upon which the pinion 53 and sprocket 54 are loosely journaled, one end of the arm 62 being provided with a weight 64 for keeping sprocket 61 up to its work. The pin-wheel 50 is secured to and driven by shaft 65, which passes through to the opposite side of the machine and is provided with a pulley 66 for driving belt 29 and imparting power to shaft 18, the opposite end of shaft 65 being provided with driving-pulley 67, which may be connected to any suitable source of power.

The shaft 41 being driven intermittently by the notched wheel 49, the desired intermittent motion may be imparted to the conveyer 1 from shaft 41 by sprocket 68 on the latter shaft and belt 69, running over sprocket 70 on shaft 71, which carries the roller or drum 72 of the upper end of conveyer 1.

As the board 2 passes under the rolls 5 6 7 it is supported by companion rolls 73 74 75, arranged under the rolls 5 6 7, respectively, and these rolls 73 74 75 are driven intermittently in time with the movement of the presser-foot 3 and the conveyer 36 38 from the shaft 42 by means of a belt 76, which passes around sprocket-wheel 77 on said shaft and a sprocket-wheel 78 on the shaft 79 of roll 73. The shafts 80 81 of rolls 74 75 are provided with sprocket-wheels 82 83, which are connected together by short belt 84, and shaft 80 is provided with an additional sprocket-wheel 85, connected to a sprocket-wheel 86 on shaft 79 by short belt 87, thus enabling shaft 42 to drive all of the rolls 74 75 in the same direction.

The rolls 73 74 75, as well as the rolls 5 6 7, are hollow, and the former rolls are supplied with steam through hollow journals 88, while the latter rolls are supplied with steam through hollow journals 89, connected to a steam-supply pipe by flexible tubes 91. The upper rolls 5 6 7 are vertically adjustable, and their said hollow journals 89 and their solid journals 92 are mounted in bearing blocks or boxes 93 94, respectively, which slide in vertical ways 95 in the frame 96. The upward movement of the upper rolls, however, is resisted by suitable springs or cushions 97, interposed between the boxes 93 94 and adjusting-screws

98, which have enlarged heads 99, against the under sides of which the springs 97 bear, so that pressure of each roll upon the board may be regulated as desired.

In the modification of my invention shown in Fig. 12 the surfaces of the hollow bars 36 are covered by a belt or apron 100, which avoids the possibility of the board being squeezed between the bars 36 or forced into their perforations 37. This apron is in a continuous form, passing around drums 101, arranged at the outer sides of the shafts 41 42 and, if desired, driven in any suitable way.

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

1. In a machine for the purpose described, the combination of a support for the board to be treated or pressed, means for intermittently advancing the board across said support, and means comprising an absorbent for compressing the board against the said support, substantially as set forth.

2. In a machine for the purpose described, the combination of a support for the board to be treated or pressed, means for advancing the board across said support, and means for squeezing the board upon said support, having passages for receiving the fluid squeezed therefrom, substantially as set forth.

3. In a machine for the purpose described, the combination of a support for the board to be treated or pressed, means for advancing the board across said support, and a rising and falling presser-foot for squeezing the board on said support, having an inclined face opposed to said support, substantially as set forth.

4. In a machine for the purpose described, the combination of a support for the board, and means having flat surfaces above and below the board and over said support for squeezing the board, having passages for receiving the liquid squeezed out of the board, said lower means being movable with the board, substantially as set forth.

5. In a machine for the purpose described, the combination of means having a flat surface for squeezing the water out of the board, movable longitudinally therewith and having a foraminous surface opposed to the board, and channels for receiving the water through said foraminous surface, substantially as set forth.

6. In a machine for the purpose described, the combination of a support for the board to be treated, rising and falling means for squeezing the board against said support, and a traveling absorbent member passing between the board and said squeezing means, substantially as set forth.

7. In a machine for the purpose described, the combination of means for supporting the board to be treated, means for squeezing the board on said support, a drying-chamber, and

an absorbent belt passing between said squeezing means and the board and through said drying-chamber, substantially as set forth.

8. In a machine for the purpose described, the combination of a traveling conveyer, comprising flat bars for supporting the board to be treated, and means for squeezing the board against said bars, substantially as set forth.

9. In a machine for the purpose described, the combination of a conveyer, comprising flat-faced, hollow, perforated bars, for supporting the board to be treated, and means for squeezing the board against the said bars, substantially as set forth.

10. In a machine for the purpose described, the combination of a conveyer, comprising flat, hollow, perforated bars, for supporting the board to be treated, an anvil arranged under and supporting said bars, and means arranged over said anvil and bars for squeezing the board against the bars, substantially as set forth.

11. In a machine for the purpose described, the combination of a conveyer, comprising hollow, perforated bars, a continuous apron passing around said conveyer, over the faces of said bars, for supporting the board to be treated, and means for squeezing the board against said apron, substantially as set forth.

12. In a machine for the purpose described, the combination of a conveyer for supporting and advancing the board to be treated, and having means for receiving the moisture squeezed out of the board, a drying-chamber through

which said conveyer passes, and means for squeezing the board against said conveyer; substantially as set forth.

13. In a machine for the purpose described, the combination of a conveyer for supporting and advancing the board to be treated, means arranged over said conveyer for squeezing the board thereagainst, an absorbent belt passing between said means and conveyer, and means for intermittently advancing said conveyer and moving said belt, substantially as set forth.

14. In a machine for the purpose described, the combination of means for squeezing the board, means for advancing the board, an absorbent belt passing between the board and the squeezing means, and means for traveling said belt in the opposite direction of the advancing movement of the board, substantially as set forth.

15. In a machine for the purpose described, the combination of a conveyer for supporting and advancing the board, and guide-flanges, carried by said conveyer for sustaining the edges of the board, substantially as set forth.

16. In a machine for the purpose described, the combination of means for squeezing the board, and adjustable side guides, for guiding the board to said squeezing means, substantially as set forth.

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Witnesses:

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