March 25, 1930. C. SPENGLER 1,751,953

PLASTER BOARD MANUFACTURE

Filed Nov. 17, 1926 10 Sheets-Sheet 1

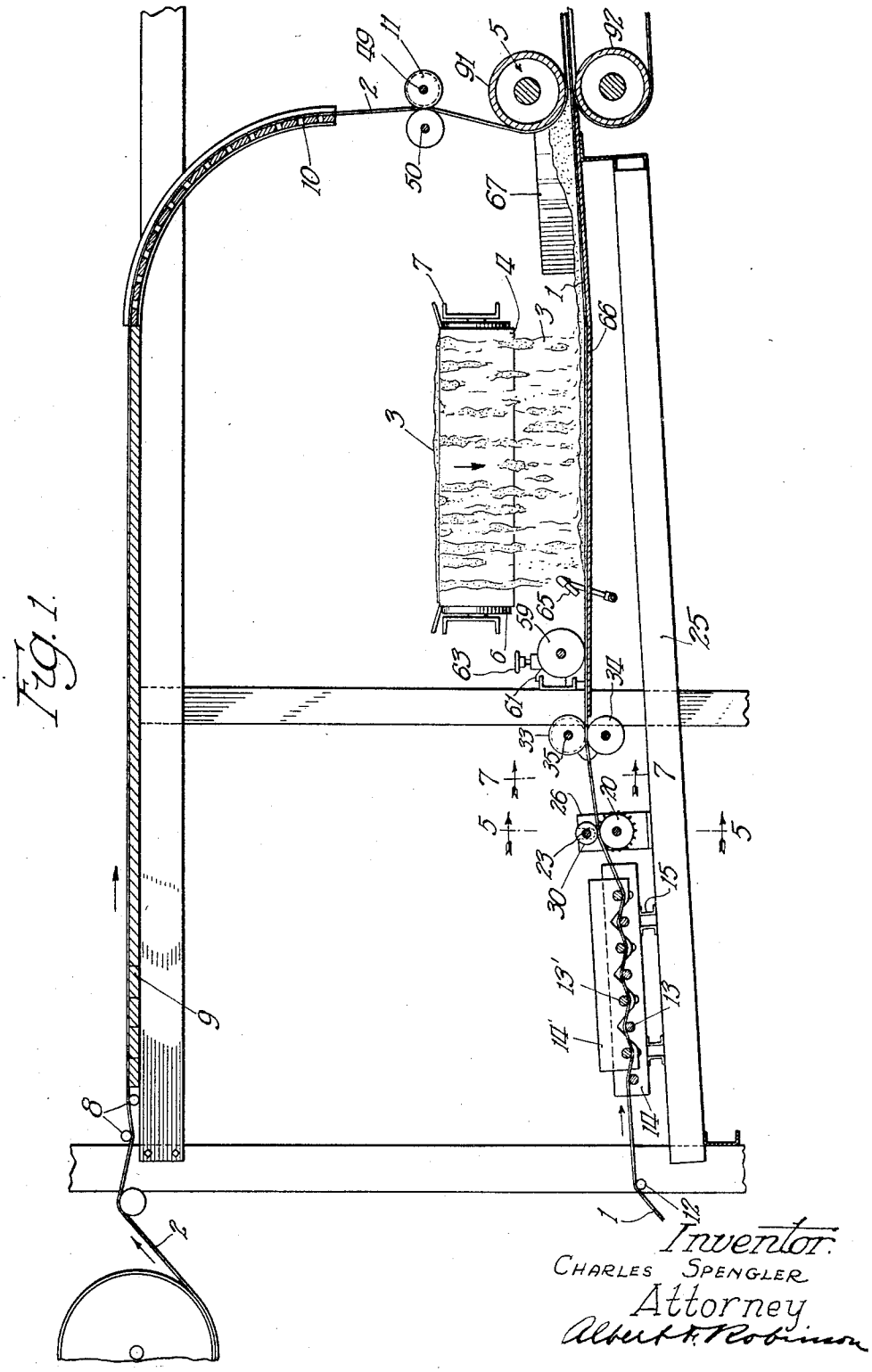


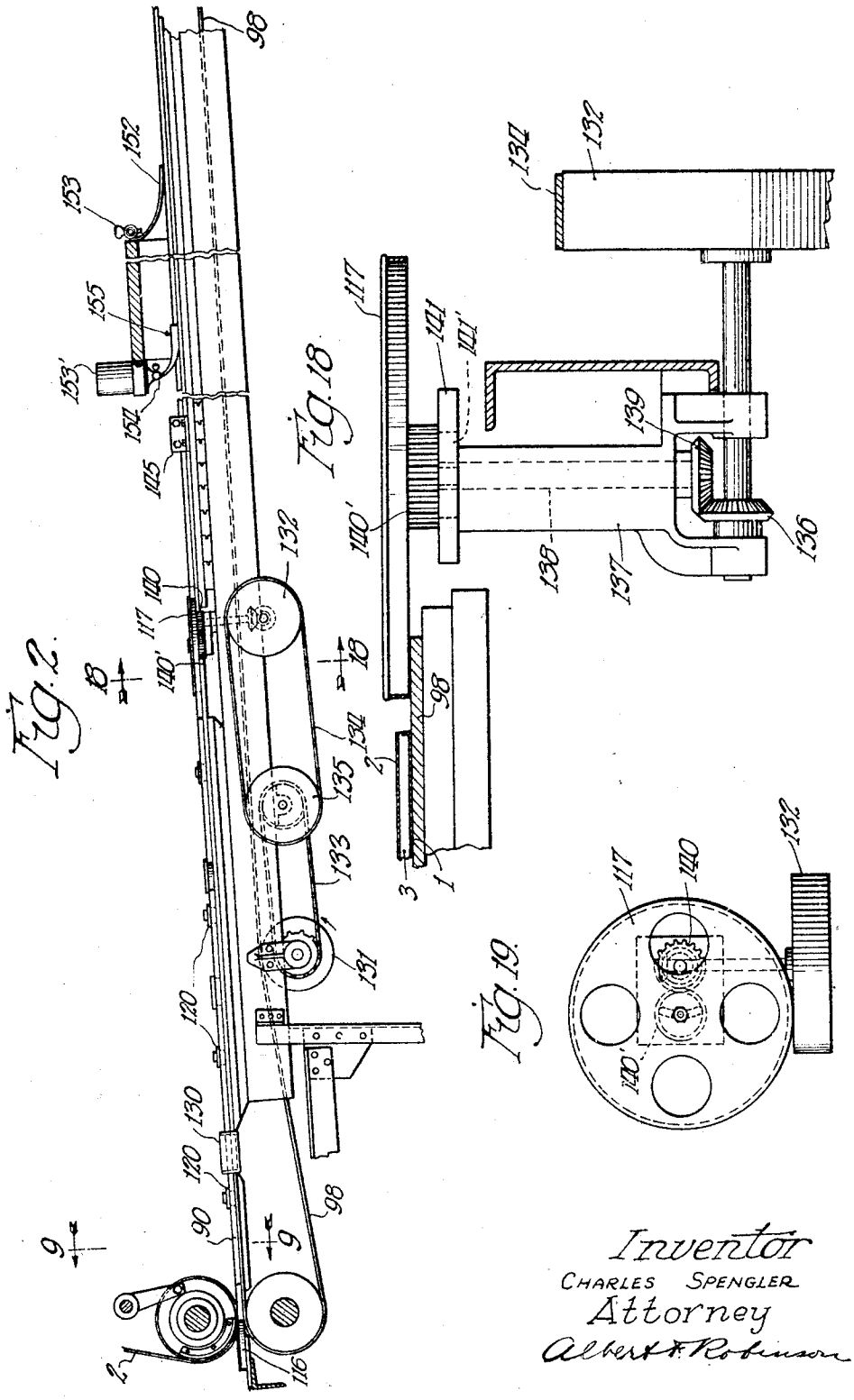
Fig. 1.

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PLASTER BOARD MANUFACTURE

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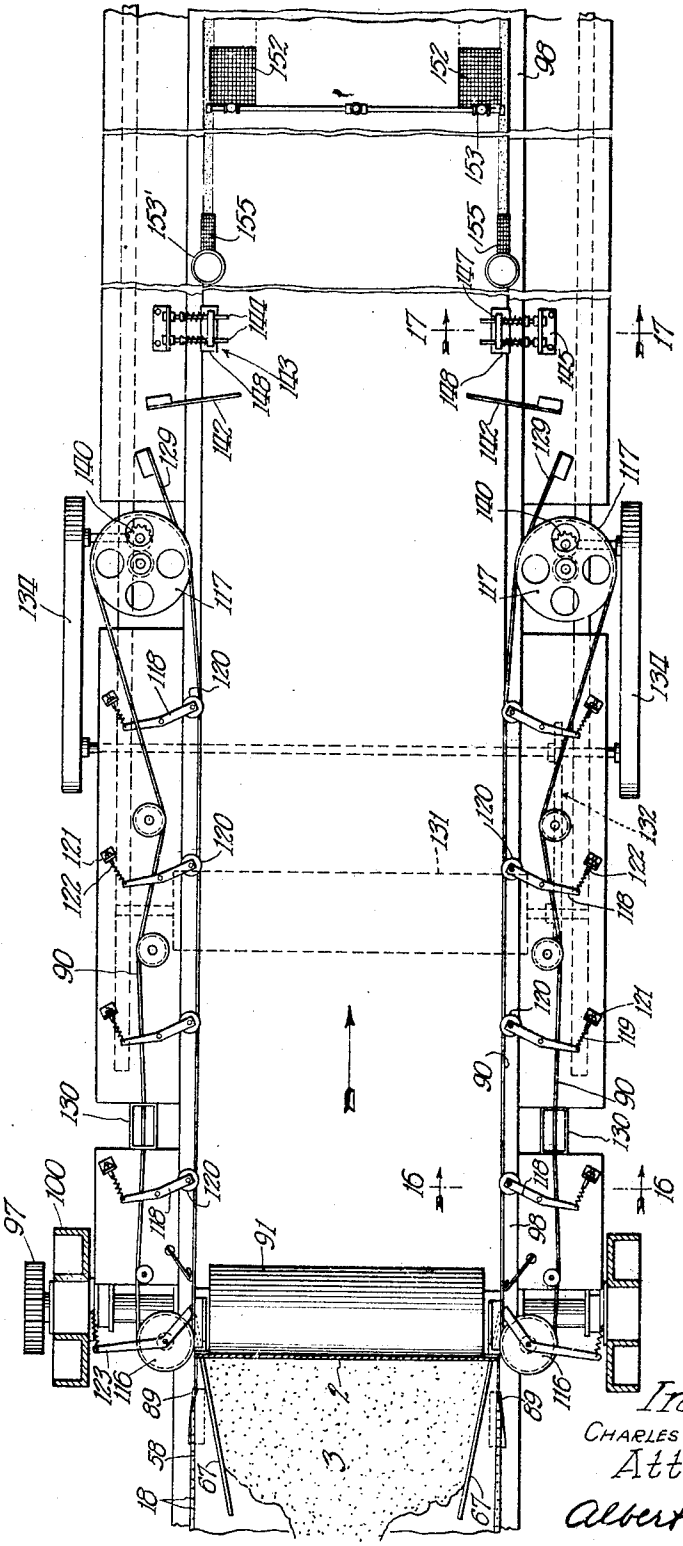
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PLASTER BOARD MANUFACTURE

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Fig. 4.



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PLASTER BOARD MANUFACTURE

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Fig. 3.

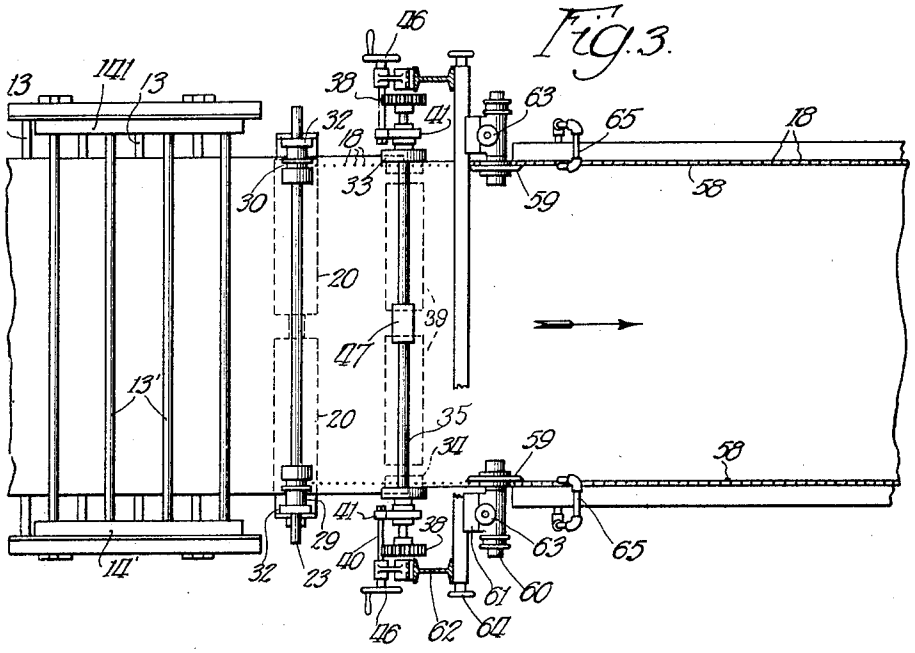


Fig. 5.

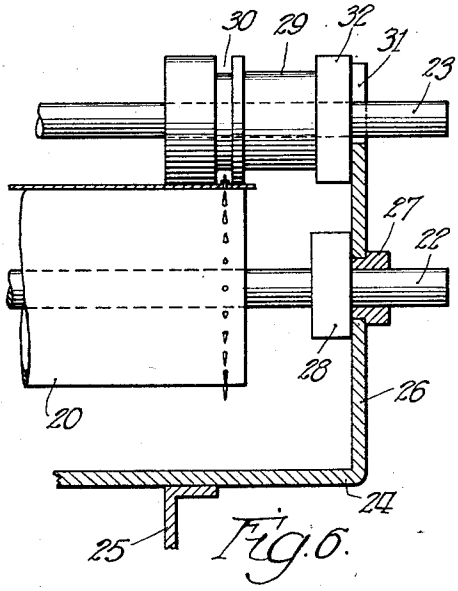


Fig. 6.

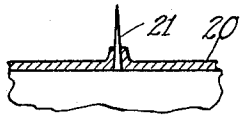
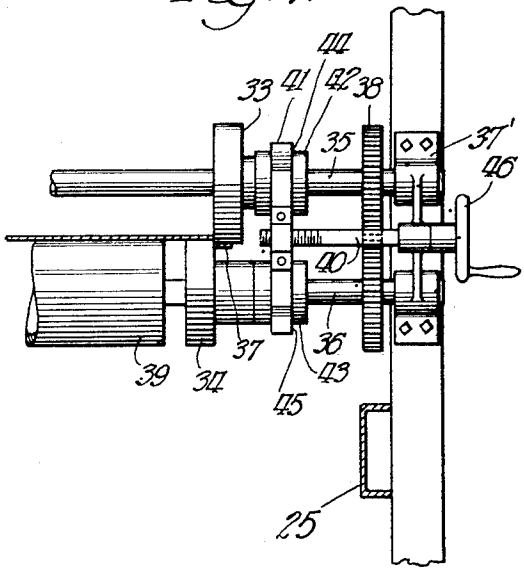


Fig. 7.



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PLASTER BOARD MANUFACTURE

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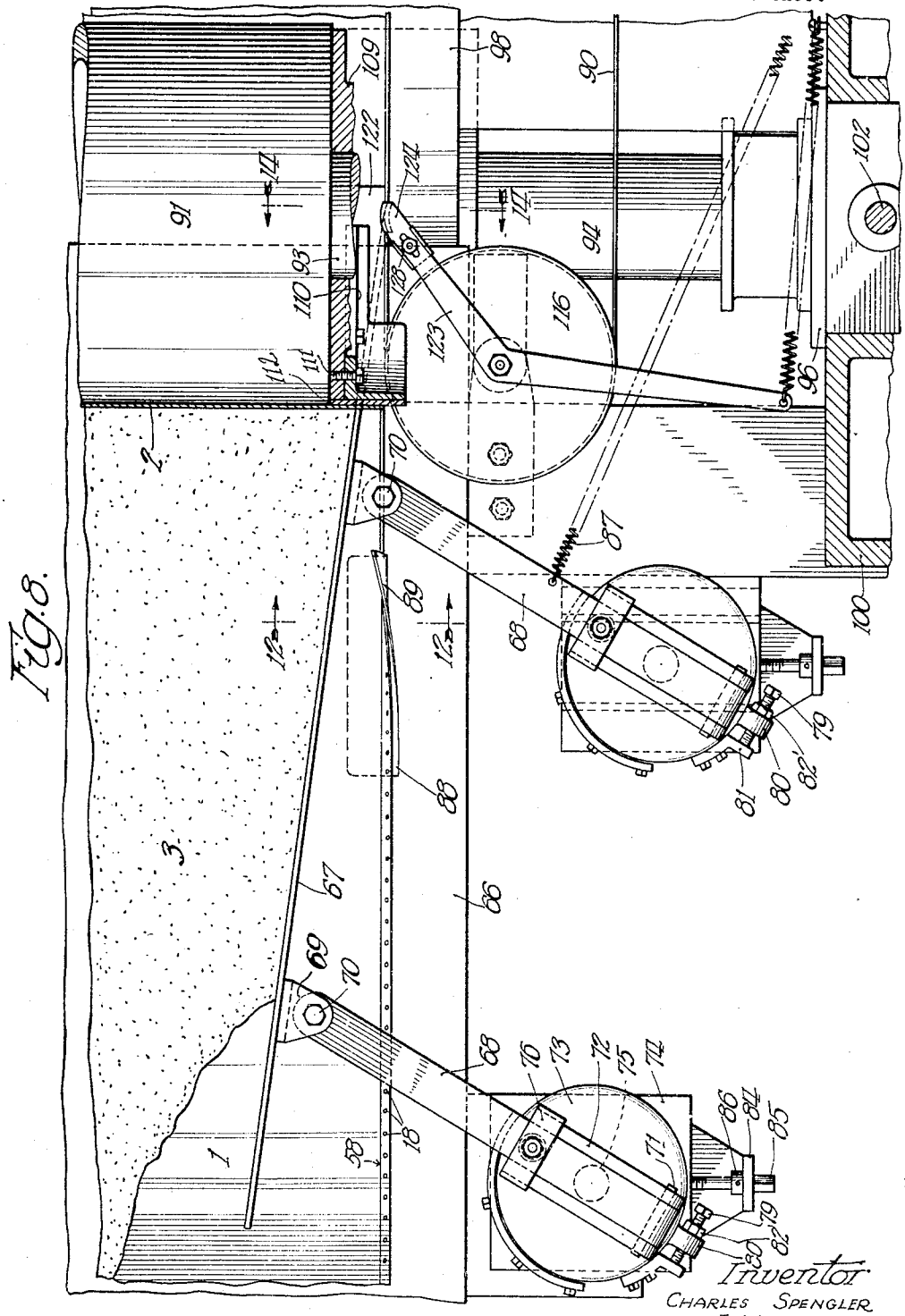


Fig. 8.

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PLASTER BOARD MANUFACTURE

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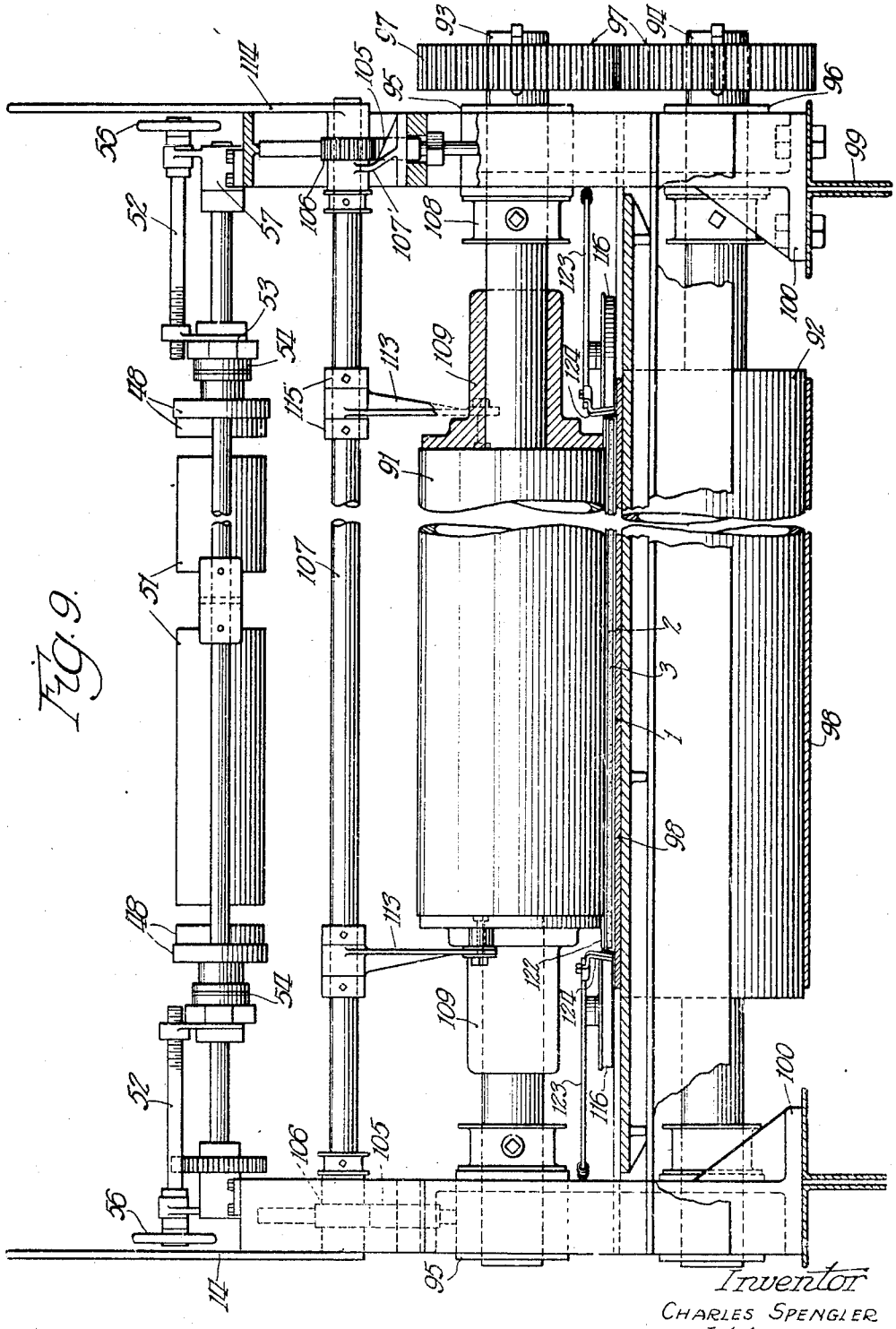


Fig. 9.

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PLASTER BOARD MANUFACTURE

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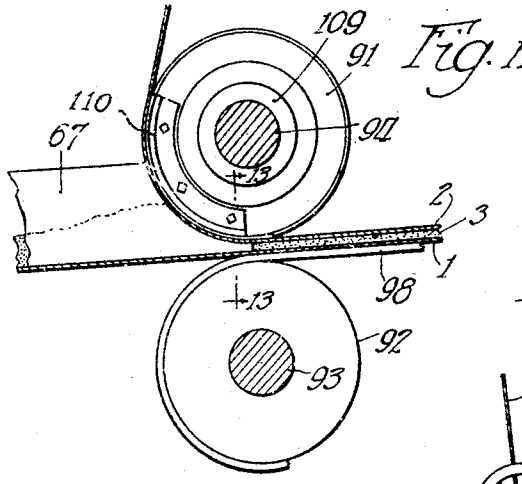


Fig. 11.

Fig. 10.

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PLASTER BOARD MANUFACTURE

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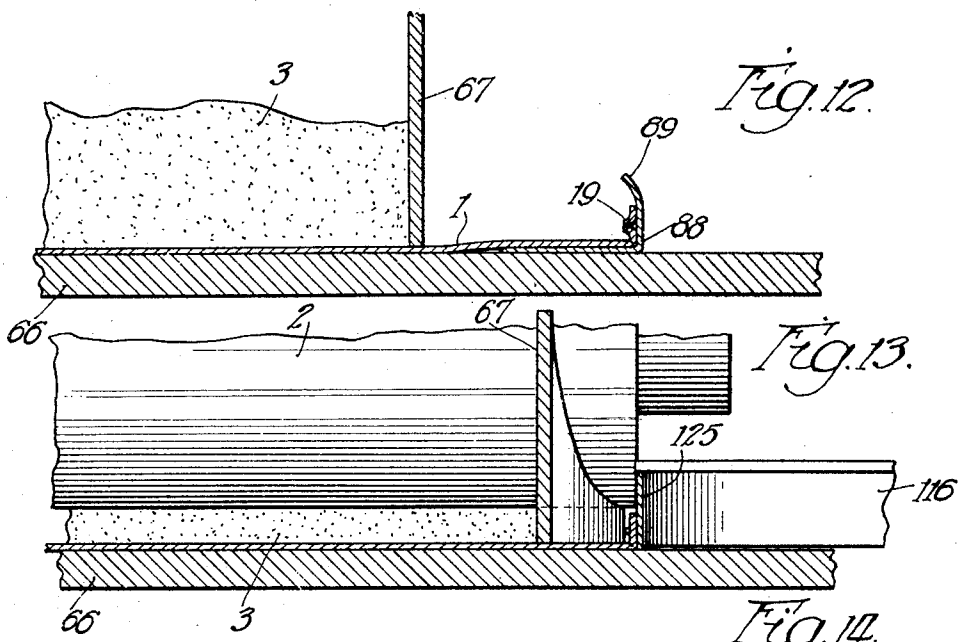
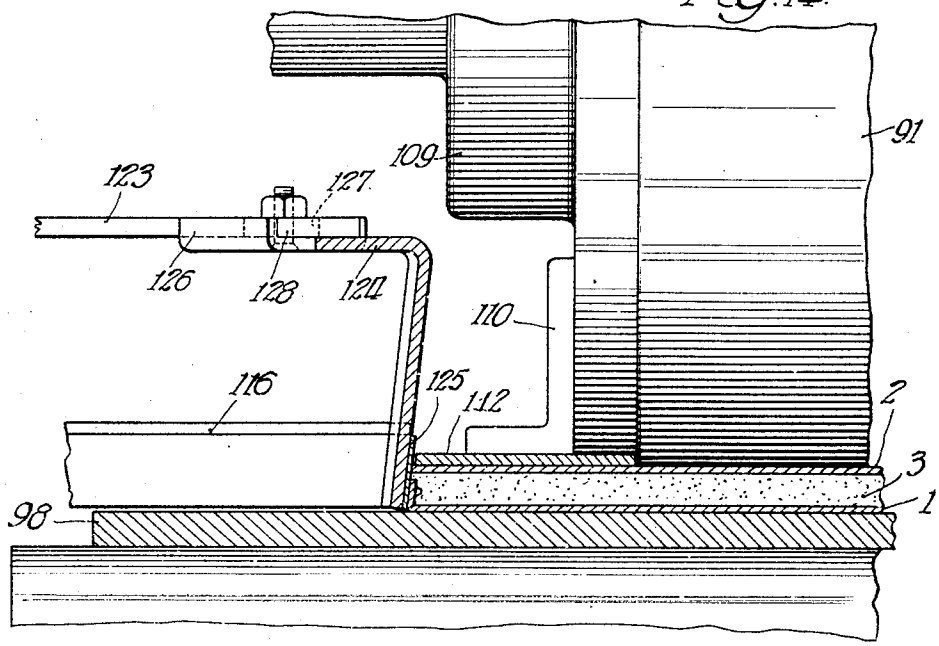


Fig. 12.

Fig. 13.

Fig. 14.



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PLASTER BOARD MANUFACTURE

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Fig. 15

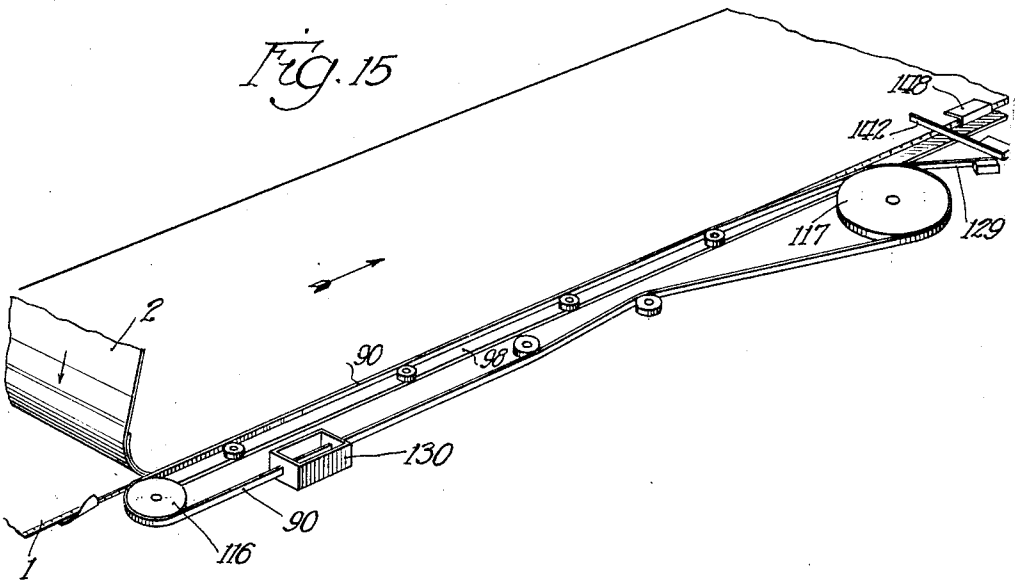


Fig. 16.

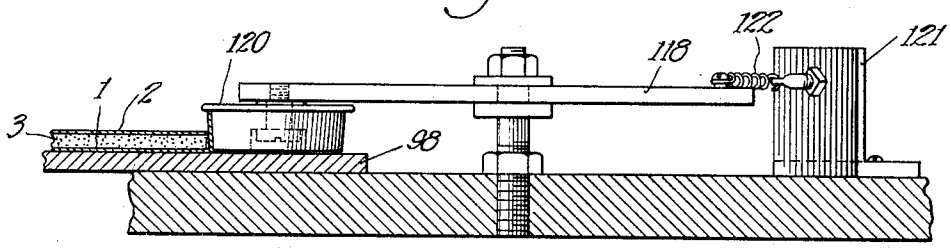
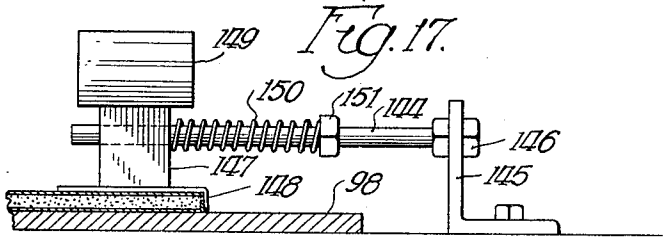


Fig. 17.



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PLASTER BOARD MANUFACTURE

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Fig. 20.

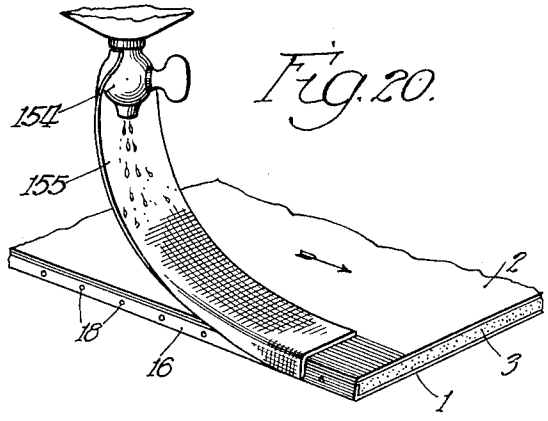


Fig. 21.

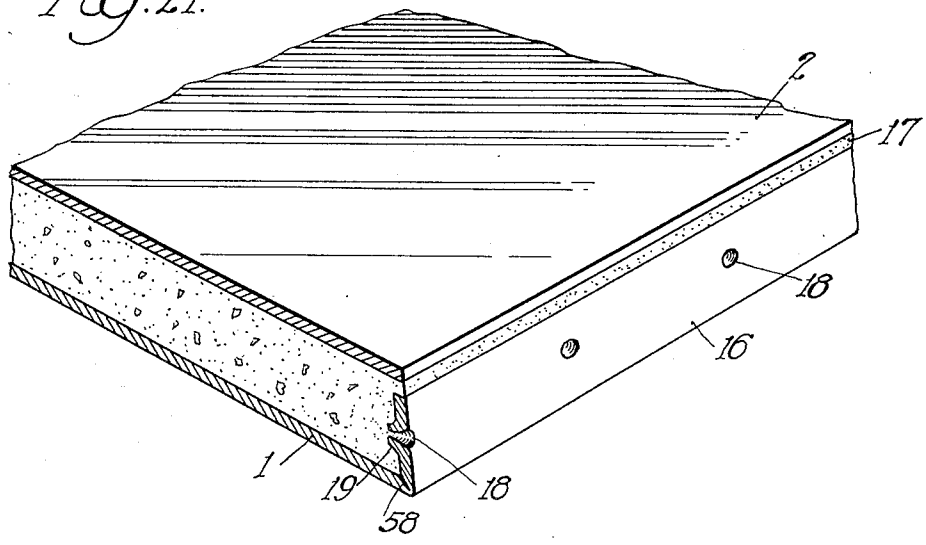
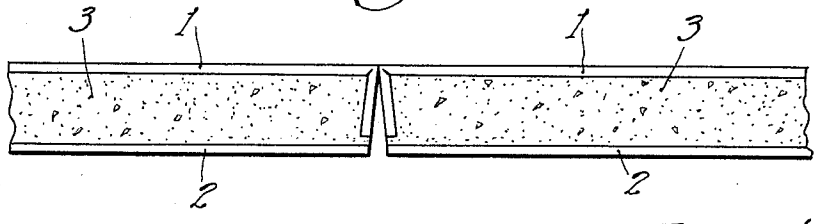


Fig. 22.



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1,751,953

UNITED STATES PATENT OFFICE

CHARLES SPENGLER, OF AKRON, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CERTAIN-TEED PRODUCTS CORPORATION, A CORPORATION OF MARYLAND

PLASTER-BOARD MANUFACTURE

Application filed November 17, 1926. Serial No. 148,843.

This invention relates to the manufacture of plaster wallboard and the like and aims to provide an improved process and machine which will operate more efficiently and with less manual supervision than those now used, and which produces a superior product.

The nature of the invention may be understood readily by reference to one illustrative embodiment which is shown in the accompanying drawings, in which:—

Fig. 1 is a side elevational view of the receiving end of the plaster board apparatus;

Fig. 2 is a side elevational view of an intermediate part of the apparatus continuing from Fig. 1;

Fig. 3 is a plan view of the receiving end of the apparatus over which the bottom cover sheet is fed;

Fig. 4 is a plan view of that part of the apparatus shown in Fig. 1;

Fig. 5 is a sectional view taken on line 5—5 of Fig. 1;

Fig. 6 is a detailed view of one of the perforating teeth of Fig. 5;

Fig. 7 is a view of the trimming rolls taken on line 7—7 of Fig. 1;

Fig. 8 is a plan view of a portion of the apparatus shown in Fig. 1;

Fig. 9 is a side elevational view of the pressure rolls taken on line 9—9 of Fig. 2;

Fig. 10 is an end elevational view of Fig. 9;

Fig. 11 is a vertical sectional view taken through the pressure rolls;

Fig. 12 is a view taken on line 12—12 of Fig. 8;

Fig. 13 is a view taken on line 13—13 of Fig. 11;

Fig. 14 is a view taken on line 14—14 of Fig. 8;

Fig. 15 is a perspective view of Fig. 4;

Fig. 16 is a view taken on line 16—16 of Fig. 4;

Fig. 17 is a view taken on line 17—17 of Fig. 4;

Fig. 18 is a view taken on line 18—18 of Fig. 2;

Fig. 19 is a plan view of Fig. 18;

Fig. 20 is a perspective view of the device employed for applying sizing to the margins and edges of the board;

Fig. 21 is a perspective view of a portion of the board;

Fig. 22 shows two boards laid adjacent with their inclined edges in contact.

The illustrative composite board is typified herein by a plaster board composed of a plaster body or the like which is faced by cover sheets, such as paper, coextensive with the surface area of the board for reinforcing the plaster body. The margins of one or both cover sheets can be arranged to cover the side edges of the plaster body. In the present instance, the margins of the bottom sheet are folded over the edges of the plaster body and adhered thereto.

In the illustrative apparatus board is made by what is known as the continuous process wherein the cover sheets are continuously fed into the receiving end of an apparatus while the plaster body is being concomitantly sandwiched between them. During the process of forming the board, the cover sheets are reduced to desired widths, the margins turned over the edge of the plaster body, and the composite board is reduced to the proper thickness by being subjected to pressure devices. At an appropriate period in the process devices engage the edges of the board to retain the folded margins in contact with the plaster body until the plaster has reached the proper condition.

The board is made in a continuous strip or sheet, moving through the apparatus to the delivery end where it is cut into suitable lengths as soon as the plaster has become sufficiently hard to permit the board to be handled. These lengths are then usually conveyed to dryers where all excess moisture is removed.

Referring to illustrative apparatus and process shown in the drawings, the various operations which take place to manufacture the composite board will be described in sequence from the receiving end of the apparatus (Fig. 1) where two cover sheets 1 and 2 are fed from respective feed rolls to the delivery end where the composite sheet is cut into suitable and convenient lengths and transmitted to a dryer.

Plastic material 3 is interposed between

the cover sheets being delivered by endless conveyor 4 and deposited on the bottom cover sheet just before both sheets pass between pressure rolls 5. One of the drums 6 over which the endless conveyor circumvolves is supported in brackets 7 by trunnions carried on the drum.

Sheet 2 is unrolled over a plurality of idlers 8 and a flat surface 9 of the frame, the latter terminating in a lip 10, after which it is trimmed to the proper width by trimming devices denoted generally at 11. Sheet 1 is unrolled over idler 12 and between a series of rolls 13 and 13'. Rolls 13 are carried in frame 14 seated upon supports 15 that are attached to some part of the apparatus frame, while rolls 13' are carried in gravity frame 14' and arranged in alternating relation to the first mentioned rolls.

In the embodiment herein disclosed sheet 1 is illustrated with margins 16 (Fig. 21) folded over the edge of the plaster material and terminating below the other cover sheet 2 to provide an open space 17 of regulated size for reasons hereinafter given in which said plaster material is exposed. Additional bonding of the turned edges with the plaster material is insured by mutilating, as by perforating, the edges at 18 to provide anchorages such as the pressed out tongues 19 which embed in the plaster. Appropriate mechanism for perforating the edges is represented by (Figs. 5 and 6) drums 20 each provided on one end with an annular row of teeth 21. These teeth are preferably conical, and can be attached to the drums in any well known manner. The drums are fixed on a journal 22 which together with journal 23 is mounted in bracket 24 carried on some part of the apparatus frame 25, the bracket being provided with upstanding arms 26. Inserted in the arms are bearing sleeves 27 which receive the ends of the journal 22. Thrust collars 28 prevent lateral movement of the drums in respect to the bracket. The journal 23 carries heads 29 each provided with an annular groove 30 overlying the annular row of teeth. The surfaces of the head adjacent the grooves engage the sheet and press it into contact with the periphery of the drums, thereby insuring thorough perforation of the edges. The ends of journal 23 are guided between the bracket arms by the V-shaped recesses 31 which are sufficiently deep to allow the heads to gravitate into contact with the sheet. Thrust collars 32 position the heads to adjust them relatively to the drums.

The bottom sheet is likewise trimmed to the proper width, and trimming means similar to 11 is provided (Fig. 7) comprising cylindrical disks 33 and 34 mounted respectively upon journals 35 and 36, said disks overlapping in order that their edges may be adjusted to shear the edge 37 from the strip. Both journals 35 and 36 are supported in bearing brackets 37 bolted to the vertical side bars of the apparatus frame and are geared together by intermeshing gear wheels 38, the gears being carried by the respective journals. Rolls 39 are keyed to shaft 36 and are of equal diameter with the disks in order to support and smooth the sheet during the trimming operation. These rolls are slightly less than the full width of the sheet, in order that the discs may be laterally adjusted on their respective shafts. Adjusting mechanism for the disks comprises a shaft 40 screw threaded to yoke plate 41 which engages with collars 42 and 43 that are annularly grooved at 44 and 45 respectively. The yoke is manipulated by hand wheel 46 and actuates the disks laterally upon the respective shafts but permits them by means of the annular groove to rotate with the journal. Bracket arm 47 provides an intermediate support for journal 35.

The trimming device for the other cover sheet 2 is substantially of like construction comprising disks 48 mounted on shafts 49 and 50. Rolls 51 are provided intermediate the sets of trimming devices to smooth and support the sheet. Rod 52 is screw threaded to yoke 53 interposed between annular grooved collars 54 that are associated with the respective shafts 49 and 50, the rod being manipulated by hand wheel 56 on journal bracket 57.

Folding the edges of the cover sheet to make a relatively sharp corner is facilitated by scoring it along the margin at 58 (Figs. 12 and 21) where the fold will be made, and this is done by a rapidly rotating scoring wheel 59 (Fig. 3) carried on shaft 60. This shaft is journalled in bearing bracket 61 attached to I-beam 62 of the apparatus frame and adapted to be laterally and vertically adjusted by respective hand wheels 63 and 64.

The scoring wheel is adjusted to score the paper along a line which will provide a margin of regulated width to be folded over the edge of the finished board. The extent of this area is determined by the amount of "suction" which is desired at the edge of the board for the reception of a joint filler which may be used at the point between adjacent boards (it being understood that the "suction" may be made to vary with the area of the exposed plaster).

A steam line 65 may advantageously be directed against the margins of the bottom sheet in order to soften and facilitate folding them over the edges of the plaster.

The bottom cover sheet after being prepared in the manner heretofore described, is continued over a stationary table support 66 at which point the plastic material is deposited thereon from the conveyor which is travelling at substantially the same rate of speed as the sheet. The plastic material is preferably uniformly spread over the surface

of the bottom sheet by some automatically or manually operated means before the top cover sheet is conjoined therewith beneath the pressure rolls, thereby insuring a board of uniform thickness and density. At this point two (Fig. 8) angularly disposed damming bars 67 are provided, terminating adjacent the pressure rolls and the folded edges of the sheet, to prevent the plastic material from flowing from the sheet or banking too near the edge thereof. These bars, preferably, are adjusted so that they diverge in the direction of travel of the paper. The adjusting device comprises a link 68 pivoted at one end to lug 69 by pintle bolts 70. The other end of the link is pivotally attached by pin 71 between lugs 72 extending upwardly from disk 73 which is pivoted to slide bracket 74 by pivot pin 75. Also on the disk 73 there is an overlying arch bar 76 secured thereto by bolt 77. Compression spring 78 envelopes this securing bolt and is retained in place between the arch bar and the link in order to actuate the damming bars into close contact with the top surface of the sheet. The link is angularly adjused by means of set screw 79 which is screw threaded to an extended lug 80 on the link and adapted to engage with a stop 81 fixed to a stationary part of the bracket. Lock nut 82′ on the set screw retains the same in any adjusted position. The lateral adjustment of the bracket is obtained by cooperating tongue 82 and groove 83 provided on the bracket and machine frame respectively in order to permit relative sliding movement. Inserted through a fixed lug 84 is screw 85 threadedly connected with the movable bracket and set in position by lock nut 86. Return spring 87 is attached to any one or both of the links and frame for holding the bars in adjusted position. In the embodiment shown, an adjusting device such as described above is provided for each end of the damming bars.

Before the paper passes the ends of the damming bars and between the pressure rolls, the edges are folded by a folding horn 88 attached to some stationary member and which is provided with curved lip 89. These edges are turned slightly beyond the vertical to form with the sheet an angle of about 80 to 85° in order that the edges of the composite board will be slightly inclined as illustrated in Fig. 22. With this construction, the edges of adjacent boards, when fitted into a building structure, may be brought into such close union that the need for filling material usually inserted therebetween can frequently be eliminated. After the edges of the sheet are folded in the manner indicated and the plaster material deposited thereon the other cover sheet is fed into conjunction therewith between the pressure rolls and against an edge band 90 representing means which cooperate to form the edge of the product.

The pressure rolls comprise superposed rolls 91 and 92 keyed to respective shafts 93 and 94. Shaft 93 is journalled in bearing block 95, and shaft 94 is journalled in bearing block 96, both shafts, however, being geared together by intermeshing gear wheels 97 (Fig. 9). The bottom pressure roll is somewhat wider than the composite strip and serves as an end roller over which endless conveyor 98 circumvolves, the endless conveyor providing the support of the composite strip from the time the strip leaves the table support until transferred elsewhere. It of course will be obvious that the endless conveyor is substantially wider than the composite sheet to support it throughout its entire area. The bearing blocks 96 which journal the lower pressure roll shaft are slidably supported on the frame bars 99 of the machine frame between vertical standards 100, the blocks being provided with flanges 101 which engage the edges of the vertical standards. Similarly, bearing blocks 95 which support the upper roll are retained between the vertical standards by means of flanges 102. Relative movement between the superposed bearing blocks is obtained by male and female connection 102, however, movement of the upper roll away from the lower roll is regulated by screw nut 103 on rod 104. The upper end of rod 104 is provided with a series of ratchet teeth 105 adapted to cooperate with pinion gears 106 on rod 107 for the purpose hereinafter described, rod 107 being journalled in bearing 107′. Thrust collars 108 are clamped to both roll journals adjacent the bearing block to prevent lateral movement thereof.

The top pressure roll is narrower than the lower pressure roll and is provided on each end with an adjustable fixed head 109 to which a bearing shoe 110 is attached by means of bolts 111. The shoe and head are faced with plate 112 of sufficient thickness to make the bearing surface flush with the periphery of the pressure roll and of sufficient width to extend from the edge of the pressure roll a substantial distance over the edge of the composite board. The head is rotatably adjustable upon the top journal, and by means of link 113 connection is made between the head and shaft 107. The shaft is actuated by manipulation of one of the handles 114 arranged on either side of the apparatus. The links are secured in place upon shaft 107 by thrust collars 115.

The edge band 90 is of metal construction and travels around a series of vertically disposed pulleys 116, one of which 117 is driven from some source of power, at the same rate of speed as the board. The endless band travels in contact with the edge of the board for a distance determined by the condition of the plaster and the band. Too long in contact between band and the edge of the board might result in adherence of plaster to the

band with consequent damage to the edge. If there be too short a period of contact so that the plastic material has inadequately bonded with the paper before proper bonding has been completed the margins may be left loose and may unfold. In the present embodiment with the rate of board travel from forty to sixty feet per minute, the board advantageously contacts with the edge for a distance of about eight feet. This distance may be suitably varied with change of speed or other conditions.

Between the driven pulley and that idler adjacent the pressure rolls, are mounted a plurality of pressure actuators comprising pivoted arm 118 one end of which engages the band with the edge of the board and the other end of which is connected with yieldable means 119. That end which engages the band may be provided with roll 120 and actuated against the band by the spring which is adjustably attached to the lug 121 by screw 122. Any number of these pressure devices may be positioned between the pulleys. Arm 123 (Figure 8) is similar to the others herein described except that it is provided with an angle bar 124 instead of a roll, the bar carrying a wear strip 125. Adjustment of the bar in respect to the arm is procured by the sliding connection provided by the guide lugs 126 on the bar and the elongated slot 127 in the arm. Bolt 128 clamps the two in adjusted position. During the time that the band is in contact with the edge of the board it may become smeared with plaster which is appropriately removed by passing the band through a cleaning device before it again contacts with the board. A clean band is obviously desirable because it minimizes the tendency of plaster to adhere to it. In the present instance the cleaning device is represented by a resilient scraper 129 which is placed adjacent the drive pulley to contact with the band and remove all accumulations thereon. In addition to this the band is cleaned by running it through trough 130 filled with a suitable cleaning solution, preferably soap and water.

The drive mechanism for the endless band comprises a motor 131 suspended beneath the apparatus and connected to driving drum 132 by means of sprocket chain 133, belt 134, and an intermediate drum 135. Each end of the driving drum journal is provided with a bevel gear 136 and journalled in brackets 137. Shaft 138 is vertically disposed in the bracket and provided on one end with bevel gear 139 which co-operates with the beveled gear 136 on the drum journal and on the other end with a pinion 140 which intermeshes with pinion 140′. Plate 141 to which the vertically disposed pulley is attached is provided with an arcuated slot 141′ whereby said pulley and gear 140′ may be adjusted with respect to shaft 138 and to the edge of the board. At this point too another scraper 142 identical to 129 is provided to scrape the top margin of the board to remove any lumps of plaster material.

After the board has been subjected to the above described operations during its course of manufacture, it is preferably run between one or more friction numbers denoted generally at 143 which smooth and finish the edges and margins of the board. In the present instance each of these members comprises rods 144 loosely connected at one end to a fixed angle iron 145 by retaining nuts 146. There is slidably mounted upon the other end a block 147 carrying a flanged shoe 148, the shoe being pressed against the top of the board by weight member 149 and against the edge by springs 150. The spring envelopes the rods and is compressed between nuts 151 thereon and the movable block. The frictional contact of the shoe against the board smooths the edges of the board.

In order to secure equal expansion of top and bottom sheets to prevent warping of the board, means are provided for increasing the moisture content of the top sheet I which is generally less moist and, moreover, which dries more rapidly. Wick means are represented by a wick 152 of substantial width which is placed beneath a water conduit or tank. Water from the conduit is delivered in needed amount to the wick from nozzle 153 as said wick drags over the sheet.

A similar construction may advantageously be employed for treating and toughening the margins and edges of the board. During the handling and transportation of plaster board lengths, they are slid along on their edges, thereby causing the paper to become scuffed and shaggy and frequently unfit for use. In order to overcome this tendency this portion of the board is bathed with a sizing solution such as glue and water which will prevent the edges from scuffing. A supply of the solution is contained in a reservoir 153′ and is conducted thru the nozzle 154 to wick 155 which become saturated therewith and brushes along the margins and edges of the board.

Claims relating to this feature have been presented in a separate application Serial No. 164,273, filed January 28, 1927.

When the board has been subjected to these operations and moved over the conveyor the plaster has set sufficiently for the boards to be handled. They are then cut in suitable and convenient lengths, and subsequently transferred to dryers where excess moisture is removed.

It will be obvious from the foregoing disclosure, that my invention is not limited to the details of the illustrative embodiment above described, since these may be variously modified. Moreover it is not indispensable that all features of my invention be

used conjointly, since it will be obvious to those skilled in the art, that various schemes may be advantageously employed in various other combinations and sub-combinations.

Having described one embodiment of my invention, I claim:

1. A plaster board apparatus comprising means for advancing a sheet over a perforating device for perforating the margins thereof, means for folding the perforated margins, means for depositing plastic material on the sheet between the folded margins, means for affixing a cover sheet over the plastic material, and metal means arranged on each side of the sheets traversing therewith to support the folded margins for a predetermined distance.

2. A plaster board apparatus comprising means for advancing a sheet over a perforating device for perforating the margins thereof, means for folding the perforated margins, means for depositing plastic material on the sheet between the folded margins, means for affixing a cover sheet over the plastic material, and an endless metal band arranged on each side of the sheets traversing therewith.

3. A plaster board apparatus comprising means for advancing a sheet over a perforating device for perforating the margins thereof, means for folding the perforated margins, means for depositing plaster material between the folded margins, means for affixing a cover sheet over the plastic material, and means for supporting the folded margins for a predetermined distance.

4. A plaster board apparatus comprising means for advancing a sheet over a perforating device for perforating the margins thereof, means for folding the perforated margins, means for depositing plaster material on the sheet between the folded margins, means for affixing a cover sheet over the plastic material, and an endless band arranged to traverse in contact with the edges of the formed board.

In testimony whereof, I affix my signature.

CHARLES SPENGLER.