M. K. ARMSTRONG.

ART OF MAKING PLASTER BOARD.

APPLICATION FILED MAR. 15, 1919.

1,348,387. **Patented Aug. 3, 1920.**

3 SHEETS—SHEET 1.

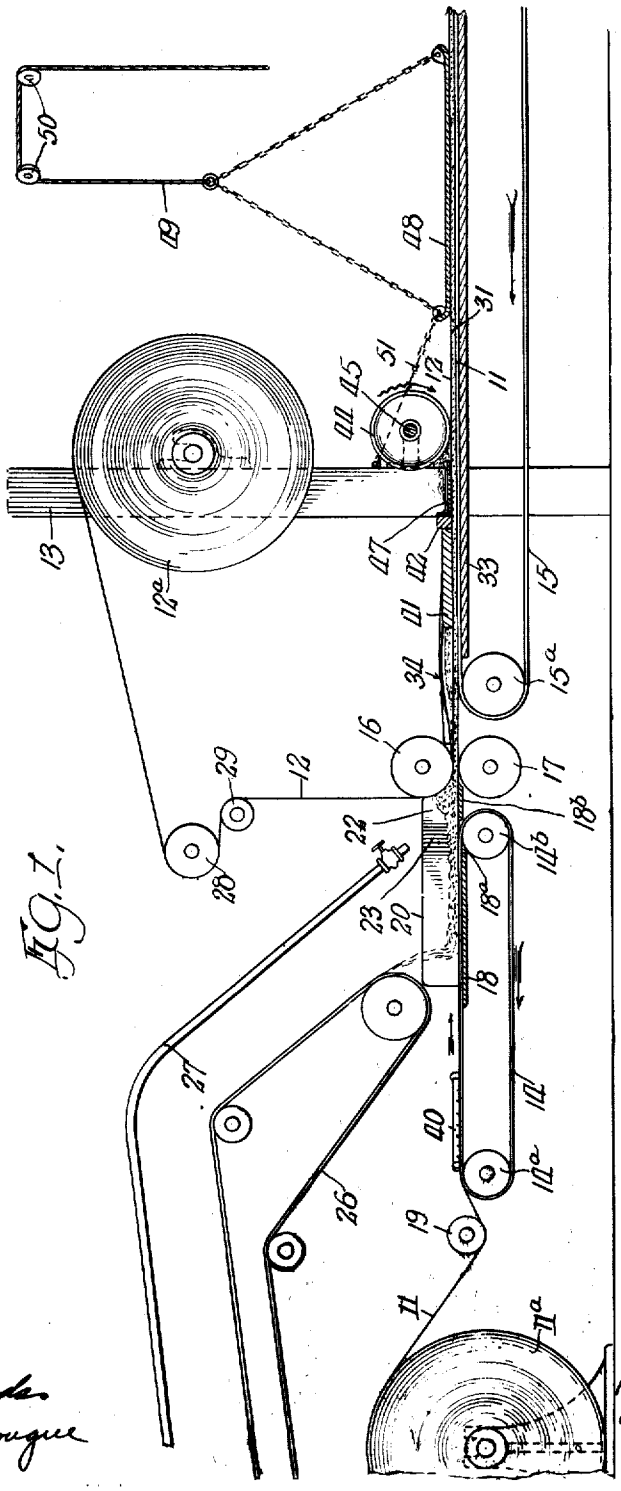


FIG. 1.

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D. Dabrenoque

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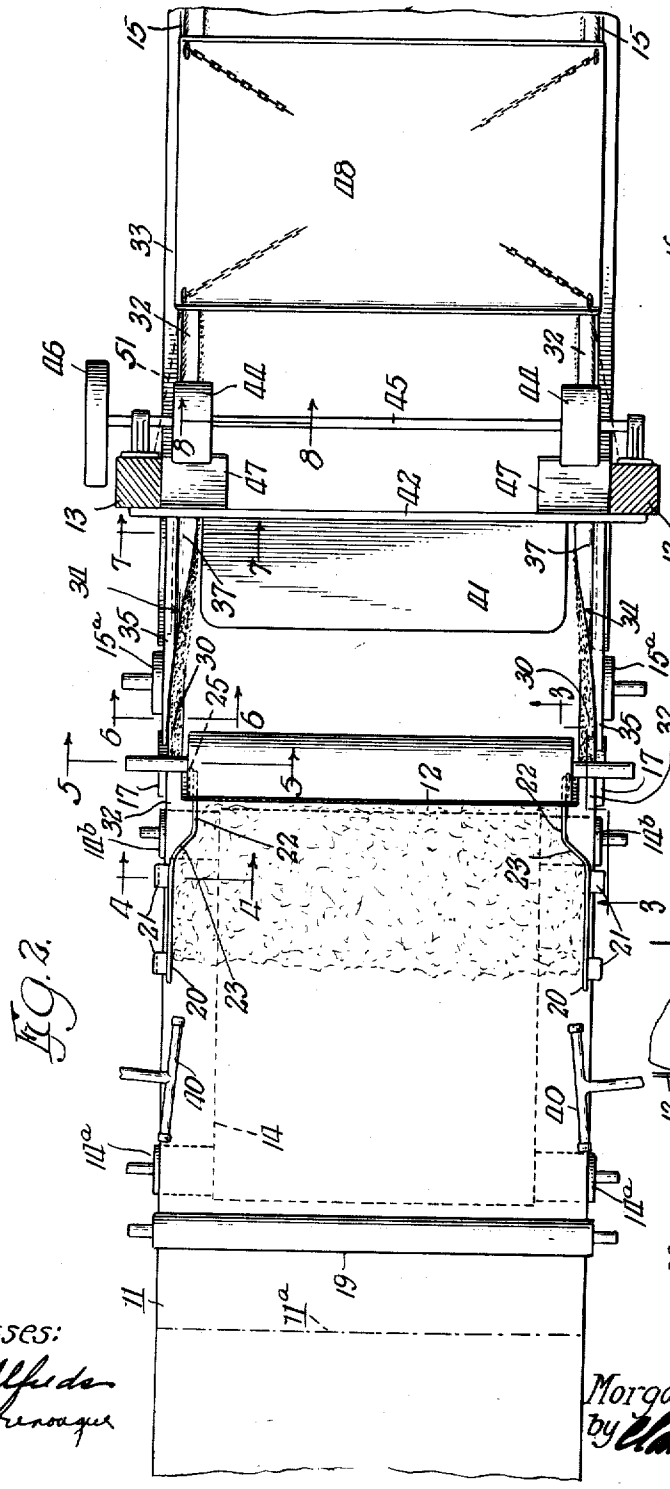


FIG. 2.

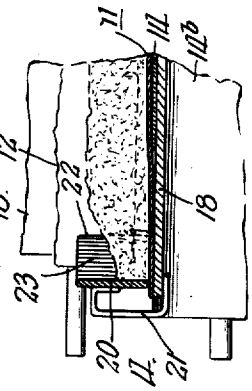


FIG. 4.

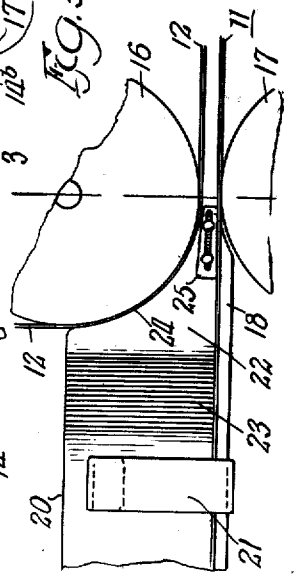


FIG. 3.

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3 SHEETS—SHEET 3.

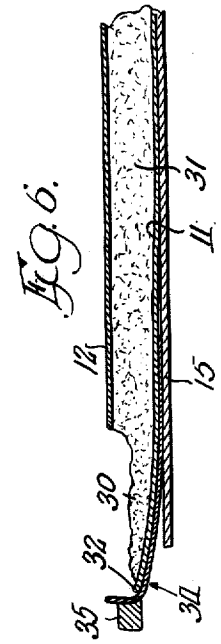


FIG. 6.

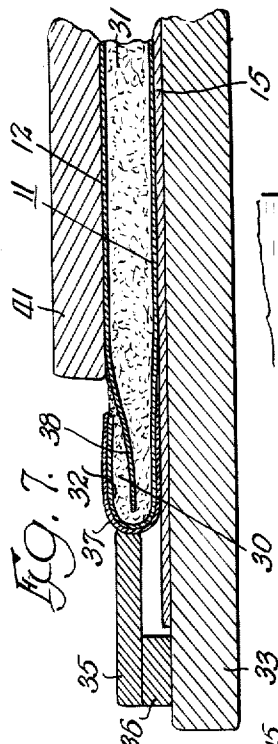


FIG. 7.

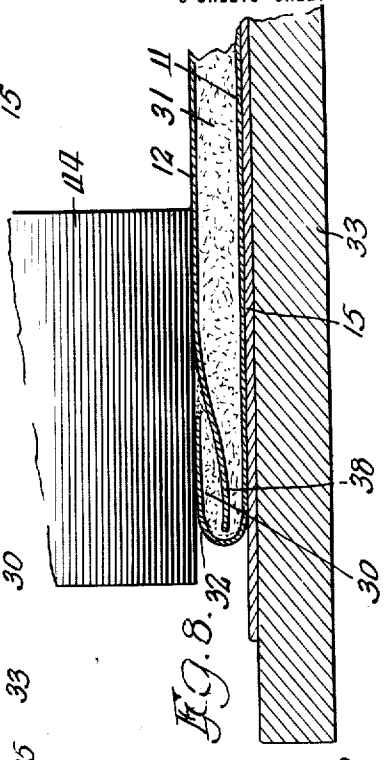


FIG. 8.

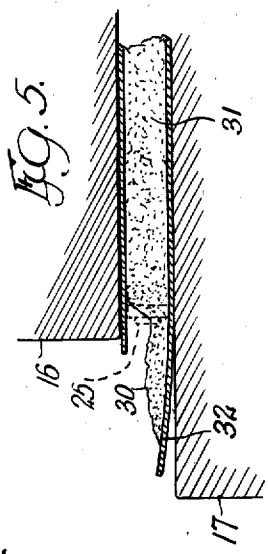


FIG. 5.

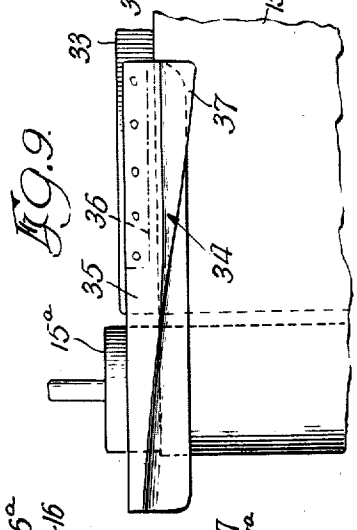


FIG. 9.

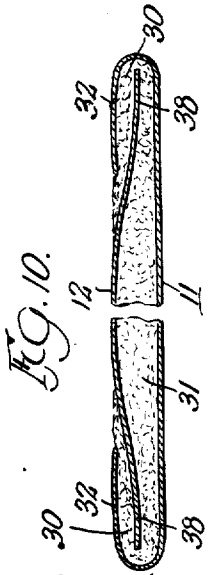


FIG. 10.

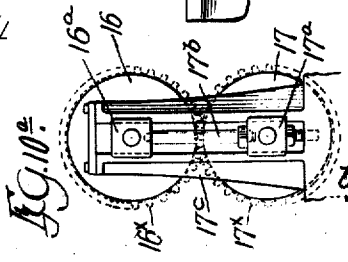


FIG. 10a.

Witnesses:

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Inventor

Morgan K. Armstrong

by Clarence E. Wehlen Atty

UNITED STATES PATENT OFFICE.

MORGAN K. ARMSTRONG, OF WINNETKA, ILLINOIS, ASSIGNOR TO BESTWALL MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF DELAWARE.

ART OF MAKING PLASTER-BOARD.

1,348,387. Specification of Letters Patent. Patented Aug. 3, 1920.

Application filed March 15, 1919. Serial No. 282,837.

To all whom it may concern:

Be it known that I, MORGAN K. ARMSTRONG, a citizen of the United States, and a resident of Winnetka, county of Cook, and State of Illinois, have invented certain new and useful Improvements in the Art of Making Plaster-Board; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in the art of making plaster board and is addressed to a novel process in the manufacture of such board. The invention further consists of the matters hereinafter described and more particularly pointed out in the appended claims.

The term "plaster board" is used herein generically, although the specific kind of board intended to be made is more technically known in the art as "wall board," which is a board to be applied directly to the studding and to take the place of both lath and plaster in the finishing of interior walls.

The board consists generally of top and bottom covering sheets of paper or other fibrous material, preferably a Manila paper, either fully or partially sized, and of an intermediate layer consisting of a plastic body to which the said covering sheets are adhered.

Such boards of the kind heretofore produced, have been made either with the edges of the plastic body exposed at the edges of the covering sheets, which are of like widths, or with the one covering sheet made wider than the other sheet and with the projecting marginal parts of the first sheet turned over upon itself to inclose the edges of the plastic body, and with the second sheet overlapped upon and cemented to the turned-over marginal parts of the other sheet, thus binding the edges of the board.

Board of both kinds has been made by means of a continuous process in which the plastic mix for the body is applied to an advancing bottom sheet and the top sheet is applied and the plastic mix is spread to the desired thickness by passing the board forming material between rolls,—the marginal portions of the bottom sheet in the case of the bound edge board, having been turned over by suitable folders prior to its reaching the spreading rolls.

While superior to the unbound board, the bound edge board last mentioned has several disadvantages. One of the chief of these is due to the fact that the top sheet is apt to be insecurely cemented at its edges to the turned-over marginal parts of the bottom sheet, so that said edges curl or stand away from the body of the board and are apt to be torn or broken away, thus greatly reducing the strength of the board at its edges.

The object of the improvement in the art described herein, is to produce a board wherein the edges of the top sheet are inclosed and in which the edge itself is reinforced so as to reduce the possibility of breaking the edges, to a minimum.

No claim is herein made to the board itself which has been incorporated in a separate, divisional application.

The apparatus for carrying out the improved process is illustrated in the accompanying drawings, in which:—

Figure 1 represents diagrammatically a longitudinal section through the apparatus;

Fig. 2 represents a top plan view of the apparatus;

Fig. 3 represents, on an enlarged scale, a section through Fig. 2, in a plane indicated by the line 3—3 of Fig. 2;

Fig. 4 represents a partial sectional view in a plane indicated by the line 4—4 of Fig. 2;

Fig. 5 represents, on a still larger scale, a partial transverse section through the apparatus, in a plane indicated by the line 5—5 of Fig. 2;

Fig. 6 represents a transverse section, in a plane indicated by the line 6—6 of Fig. 2;

Figs. 7 and 8 represent respectively, transverse sections through the apparatus, in planes indicated by the lines 7—7 and 8—8 of Fig. 2;

Fig. 9 represents a top plan view of the bottom sheet edge-folding or turning horns;

Fig. 10 represents a transverse section through the finished board; and

Fig. 10^a is an end elevation of the spreading rolls illustrating the manner of mounting and operatively connecting them.

The process may be best described in connection with the preferred apparatus

shown herein for carrying it out, so that its various steps will be described at the same time reference is made to parts of the apparatus for carrying out these steps.

The sheet or strip of paper which is made wide enough to bind the edges of the board, will herein be called the bottom sheet, for the reason that in carrying out the process, this is the sheet, in fact, which forms the bottom of the board as it is presented during its manufacture, while the other, namely the opposed sheet, will be referred to as the top sheet.

11 indicates the bottom sheet and 12 indicates the top sheet. Each of these sheets is fed from a roll,—one of the rolls 11^a being mounted on a base or on the floor below the apparatus, and the other 12^a, being mounted on suitable posts or uprights 13 rising at the sides of the apparatus. The bottom sheet 11 in its continuous advance through the apparatus, is supported by suitable endless belts 14 and 15,—the first being located near the roll of paper 11^a and at the rear of the spreading rolls shortly to be referred to, and the other, 15, being located more remote from the paper roll and in front of said spreading rolls.

The belt 14 is mounted on longitudinally spaced rolls 14^a and 14^b, and the belt 15 on similar spaced rolls 15^a and a second roll which is not shown in the drawings. Between the rolls 14^b and 15^a, there are located a pair of spreading rolls 16 and 17 which are spaced apart a distance equal to the total thickness of the board to be made. The bottom roll 17 is located with its top surface in the plane of the top laps of the two belts 14 and 15. This roll is mounted in a fixed bearing while the upper roll is mounted in vertically adjustable bearings, so that it is capable of a vertical adjustment to determine the thickness of the board. A familiar construction to provide this adjustment is shown in Fig. 10^a, wherein the rolls are shown with their shafts mounted in journal boxes 16^a, 17^a, respectively, and with a vertically adjustable rod 17^b interposed between the boxes. The boxes are mounted in pairs in an upright slotted standard 17^c and the rolls are operatively connected to be driven together by means of gears 16^x, 17^x, with long teeth, which permit the adjustment without disengagement.

At the rear of the spreading rolls is located a platform 18 which extends from the bottom spreading roll 17 to a space some distance to the rear of said roll. This platform 18 is located with its top surface in a plane tangential to the top of the roll 17 and is made wider transversely than the belt 14, the top lap of which passes through a transverse slot 18^a in the forward end of said board. (See Figs. 1 and 2.)

The bottom sheet thus advances from the supply roll 11^a, over the top lap of the belt 14, over the part 18^b of the platform 18 forward of said belt, over the bottom spreading roll 17 and thence to the top lap of the belt 15. A tension roll 19 is preferably provided intermediate the belt 14 and the supply roll 11^a.

At each side of the platform 18 and projecting into the space between the spreading rolls 16 and 17, are located mold boards 20, 20. Said mold boards determine the width of the plastic body to be included between the layers of paper, and extend parallel to each other in the direction of the feed of the paper. They are mounted with their bottom edges a distance above the top surface of the platform 18, sufficient to permit the thickness of the bottom sheet to pass underneath them, and are secured to said platform by means of overhanging brackets 21 attached to its edges.

The forward ends 22 of the mold boards 20 are offset inwardly, that is to say, toward each other, from the plane of the main length of said boards, said forward ends 22 being connected to said main lengths by means of inwardly inclined parts 23. The top edges of said forward ends 22 are curved, as indicated at 24, so that they may be made to closely engage the paper of the top sheet when it passes around the top roll, as will presently appear. Longitudinally adjustable plates 25 are attached to the outer faces of the forward ends of said mold boards. The forward ends of the mold boards themselves terminate considerable to the rear of the diametric vertical plane common to the spreading rolls 16 and 17. The plates 25 may be adjusted to more closely approach the said diametric plane, but as will appear later in the description of the process, these plates are never to be brought into a position forward of said diametric plane.

The plastic mix is discharged upon the advancing bottom sheet 11 by means of a belt conveyer 26 suitably supported above the platform 18 from a hopper (not shown). A water pipe 27 is arranged to discharge water upon the plastic mix on the bottom sheet, in case more water is required than has already been put into the mix when it is delivered to the belt conveyer.

Operatives on either side of the apparatus mix and roughly spread the plastic mixture over the bottom sheet and remove any hard particles that may have set and have become detached from the mold boards, after first adhering thereto. As the bottom sheet advances toward the spreading rolls, the plastic mix is crowded toward the center and is edged up by the mold boards and is dammed up against the spreading rolls, at the same time leaving the marginal parts of the bot-

tom sheet which project beyond the mold boards, free of the plastic mix.

The top sheet 12 is fed from its supply roll 12ª and then about tension rolls 28, 29 and then downwardly and forwardly about the upper spreading roll 16. The upper spreading roll 16 is shorter (see Fig. 5) than the bottom spreading roll and is somewhat shorter than the width of the top sheet, but extends at each end beyond the planes of the front ends of the mold boards. After the top sheet is applied, the plastic body is spread evenly as it passes with the top sheet and the bottom sheet between the spreading rolls, so that as the three parts comprising the board approach the common vertical diametric plane of the spreading rolls, the board is in the form of a bottom sheet having marginal parts on which there is no plastic material, extending beyond a plastic body on said sheet, and with a top sheet applied to said plastic body having its edges projecting slightly beyond the same. Since the plates 25 do not project into the common diametric plane of the spreading rolls, where the distance between the rolls is least, but terminates short of said plane, a little of the plastic mixture will be spread out (as the board passes beyond the ends of the mold boards) over the marginal parts of the bottom sheet (as shown in Fig. 5), the escaping plaster being indicated by the numeral 30 and the main body of the plaster being indicated by the numeral 31. By having the top roll 16 somewhat shorter than the width of the top sheet, the plastic mix is prevented from collecting on the ends of said roll and hardening thereon.

After the board passes the spreading rolls, the marginal parts of the bottom sheet (which will hereinafter be referred to by the numeral 32), with the small amount of plaster spread out thereon, are turned over to embrace the top sheet by means of folding horns which will now be described.

A table 33 is located forward of the roll 15ª (which supports the rear loop of the endless belt 15) with its surface in supporting engagement with the top lap of the belt 15. Said table is wider transversely than the belt, and is somewhat wider than the bottom sheet of the plaster board. At each side of said plaster board are mounted folding horns 34 of familiar construction, said horns at their rear ends being substantially of the cross section shown in Fig. 6, and at their front ends, being of the section shown in Fig. 7. Said horns are mounted on an overhanging block 35 attached to longitudinal strips 36 fixed at the sides of the board 33. The front end of each horn, as will be seen, has its turned-over part 37 bent so that it is somewhat inclined from the outer edge of the board to and below the horizontal, as clearly shown in Fig. 9. As the board is drawn forward, the marginal parts 32 of the bottom sheet are caught by the rear ends of the horns and said parts 32 with the plaster 30 are bent or turned over upon the top sheet, the several successive steps of the turning process being indicated in Figs. 5, 6 and 7.

The turning over of the marginal parts 32 with the plaster thereon, acts to depress the marginal parts 38 of the top sheet, as clearly shown in Fig. 7, thus leaving a substantial body of plaster between the adjacent parts of the top sheet and of the turned over margins of the bottom sheet.

In order to facilitate this turning over of the bottom sheet, I provide means for softening the marginal parts of the bottom sheet preliminarily to their reaching the folding horns,—this because since the paper is sized and stiff, it will not readily accommodate itself to the action of the folding horns unless treated in some such manner. To this end I provide in a position near the rear end of the platform 18, steam pipes 40 which are adapted to discharge jets of steam on said marginal edges and thus soften them.

To prevent buckling or bending upward of the plaster board or of the top sheet of the plaster board, during the action of the folding horns, an anti-buckling plate 41, which is narrower than the top sheet 12, is placed to bear on the top of the plaster board, said plate simply resting by its weight on the top sheet and being prevented from moving forwardly with the advancing plaster board by means of a bar 42 which extends outwardly beyond the platform 33 and is engaged against the upright posts 13.

As the plaster board passes beyond he folding horns, there is apt to be a slight excess of plaster at the edges of the turned over marginal parts of the bottom sheet (see Fig. 7). To remove this plaster and to smooth down any that remains in this position, I provide narrow rolls 44, one for each margin of the board. Said rolls are mounted on a shaft 45 to the end of which is attached a pulley 46. This pulley is connected up to drive the rolls 44 in a direction opposite to the advance of the board, so that they will in effect act as brushes to remove the excess plaster and to throw it rearwardly on trays or catch plates 47 located at the rear of said rolls and attached, as shown, to the bar 42. The rolls 44 are so located and are made of such a width with reference to the turned-over marginal parts of the bottom sheet of the plaster board that each roll will extend beyond its associated edge of the board on one side, and beyond the space occupied by the plaster to be removed on the other side, in order to take care of the usual weaving of the paper in the manufacture of the board.

After leaving the rolls 44, the board is

passed under a weighted ironing or smoothing member 48. This is in the form of a plate which may be attached to cables 49 passing over pulleys 50, so that it may be lifted out of the road when threading the machine. Said ironing or smoothing member is wider than the plaster board so that it extends beyond both edges of said board. It is prevented from advancing and moving forward with the board by means of chains 51 which are attached to the upright posts 13. The said ironing member, as the name applied to it suggests, irons out and smooths any wrinkles or buckles that appear or tend to form in the plaster board and finally flattens the board and adheres the paper sheets to the plastic layer as the plastic layer approaches or reaches a set condition.

In the making of the board the sheets are preferably so proportioned that the marginal parts 38 of the top sheet approach as nearly as may be the edges of the board, thus not only giving all the reinforcing strength to the edges of the board that may be obtained by this construction, but also insuring three thicknesses of paper adjacent the edge of the board to be engaged when nailing the board in place.

While in describing the process for making the board, I have referred to paper as the preferred coverings for the plaster body, it will be understood that the invention is not limited thereto, as sheets or strips of any material adaptable to the purpose, may be used, and I therefore, in claiming the process, refer to the sheets inclosing the plastic body of the board, as fibrous material.

The apparatus described herein for carrying out the process, forms the subject matter of a separate, divisional application.

I claim as my invention:

1. The continuous process of making plaster board, which consists of advancing a bottom sheet of fibrous material, of superposing thereon a plastic mixture to form the body of the board, of confining said plastic mix in such a manner on said bottom sheet as to leave marginal parts of said sheet exposed at each side of the same beyond the intended width of the plaster board, of superposing a narrower top sheet of fibrous material on said plastic mix and at the same time spreading the plastic mix evenly over the bottom sheet to the intended thickness of the board, of turning over the projecting marginal parts of the bottom sheet to overlap the marginal parts of the top sheet, first spreading on said projecting parts a small amount of plaster so that said small amount is turned over with the said projecting marginal parts of the bottom sheet upon the marginal parts of the top sheet, the turning-over process being continued so as to depress the marginal parts of the top sheet, and of ironing out and smoothing the board to thoroughly adhere the top and bottom sheets to the body.

2. The continuous process of making plaster board, which consists of advancing a bottom sheet of fibrous material and softening the marginal parts thereof, of depositing a plastic mixture on said bottom sheet to form the body of the board, in such manner as to leave said softened marginal parts bare and exposed, of superposing a narrower top sheet of fibrous material on said plastic mixture and at the same time spreading the mixture evenly over the bottom sheet to the desired thickness, of applying a small amount of a lesser thickness of the plastic mixture to the softened, exposed margins of the bottom sheet, of turning over said softened marginal parts with the plastic mixture thereon, upon the marginal parts of the top sheet so as to overlap and depress the same, of smoothing out the waves or undulations in the thus far finished product, and of finally adhering the said top and bottom sheets to the plastic body.

3. The continuous process of making plaster board, which consists of advancing a bottom sheet of fibrous material and softening the marginal parts thereof, of depositing a plastic mixture on said bottom sheet to form the body of the board, in such manner as to leave said softened marginal parts bare and exposed, of superposing a narrower top sheet of fibrous material on said plastic mixture and at the same time spreading the mixture evenly over the bottom sheet to the desired thickness, in flowing upon the exposed, softened marginal parts during the spreading of the plastic mixture, a small amount of said mixture, of turning over said softened marginal parts with the plastic mixture thereon, upon the marginal parts of the top sheet so as to overlap and depress the same, of smoothing out the waves or undulations in the board and of finally adhering the said top and bottom sheets to the plastic body.

4. The continuous process of making plaster board, which consists of advancing a bottom sheet of sized paper and in softening the sizing in the marginal parts thereof, of depositing a plastic mixture on said bottom sheet to form the body of the board, between its softened margins which are left bare and exposed, in superposing a narrower top sheet of paper on the plastic mixture on the bottom sheet and at the same time flowing a small amount of plastic mixture upon the softened, exposed margins of the bottom sheet and spreading the plastic mixture evenly over that part of the bottom sheet between said softened margins, of turning over said softened margins with the small amount of plastic mixture thereon, onto the marginal parts of the top sheet

so as to overlap and depress the same, and of ironing and smoothing out the thus far finished product, to thoroughly adhere the said top and bottom sheets of paper to the plastic body.

In testimony that I claim the foregoing as my invention, I affix my signature in the presence of two witnesses, this 6th day of March, A. D. 1919.

MORGAN K. ARMSTRONG.

Witnesses:
T. H. ALFREDS,
D. DARRENOUGUE.