

UNITED STATES PATENT OFFICE.

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TO THE BEAVER PRODUCTS COMPANY, INC., A CORPORATION OF NEW YORK.

PLASTER-BOARD APPARATUS.

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To all whom it may concern:

Be it known that I, CLARENCE W. UTZMAN, of Buffalo, New York, have invented an Improvement in Plaster-Board Apparatus, of which the following is a specification.

This invention relates to apparatus employed in connection with the manufacture of plaster board and the like.

Among other objects, the invention is intended to provide novel and efficient apparatus for making plaster board of improved quality and appearance, and which will assist in lessening delays and interruptions in manufacture, caused by imperfections and troublesome characteristics of the materials employed.

The invention consists in the novel constructions, combinations and arrangements, hereinafter described or claimed, for carrying out the above stated objects, and such other objects as will hereinafter appear.

The character of the invention may be best understood by referring to an illustrative apparatus embodying the invention and shown in the accompanying drawings.

In said drawings:

Fig. 1 is a side elevation of a part of the plaster board apparatus.

Fig. 2 is an end view, (certain parts being in section) of the hopper sides.

Fig. 3 is a fragmentary plan section taken along a line corresponding to line 3—3 of Fig. 1, but showing the hopper side arranged at an angle.

Fig. 4 is a cross-section of one form of plaster board which the apparatus may be designed to make.

In manufacturing plaster board or similar board containing a core or center of plaster, by what is termed the continuous process, plaster is deposited upon a traveling sheet of paper and spread to an equal depth thereon by passing the same between a pair of rolls or the like. Simultaneously, as the paper and plaster pass between the rolls, a top cover sheet is applied so that the resulting product is covered on both faces by a cover sheet. Such cover sheets are, preferably, paper of the proper quality. It is customary to fold the margins of one of the

cover sheets around the edge of the plaster body in order to protect the latter and to secure other advantages. Suitable means are provided for folding the margins during the process of manufacture of the board.

The peculiar characteristics of plaster and other materials employed in the manufacture of plaster board necessitate the provision of special apparatus to overcome the difficulties encountered in the use of such materials. For instance, plaster readily adheres to all parts of the apparatus and, if not automatically or quickly removed, soon hardens and interferes with the normal process of the machine, causing congestion and often resulting in an imperfect product or in the tearing of the cover sheets. The paper employed for covering the plaster is not always of uniform thickness or width and is frequently otherwise imperfect. Moreover, it frequently expands beyond the dimension to which the machine has been adjusted. These imperfections frequently cause the paper to catch or wedge against the hopper side and elsewhere, and result in tearing the paper. These variations also cause other difficulties which result in the interruption of or interfere with the operation of the machine.

It is accordingly desirable to provide, where possible, arrangements for relieving these difficulties automatically and preventing as far as possible the interruption of the operation of the machine.

In the drawings, 10 and 11 designate upper and lower rolls employed in a typical plaster board machine. These rolls rotate in opposite directions and are spaced to form plaster board of the required thickness. In front of the rolls is a support or deck 12 for carrying the bottom cover sheet 13. This deck terminates just short of the center line between the rolls. The lower cover sheet 13 may be supplied from a conveniently located roll of paper, not shown. Suitable apparatus, not shown, is provided for depositing plaster upon the cover sheet.

Suitable hopper construction 14 is provided at opposite sides of the machine to confine the plaster to a definite region on the cover sheet. In the drawings the hopper construction at one side only of the machine

is shown, it being understood that a similar construction may be provided at the opposite side of the machine.

The hopper construction comprises a hopper side 15, having a backing or supporting member 16 and a facing member or plate 17. The facing member, preferably, consists of glass or other material which does not rust and to which plaster does not readily adhere. If desired, Monel metal having a polished face may be employed in the hopper side construction because of its rust-proof characteristics. The rear end 18 of the glass plate 17 is beveled and converges downwardly, and is supported by a suitable supporting strip 19 fitting the bevel of the glass and secured to the backing member 16. The front end 20 of the glass facing is curved to conform to the contour of the upper roll 10, and the lower portion 21 thereof is beveled and converges downwardly to provide means for supporting this end. A member 22 or its equivalent, carried by the backing member and shaped to conform with the end 21, supports the front end of the facing. The glass is accordingly supported between the members 19 and 22, and adjusted so that the lower edge thereof projects below the lower edge of the backing member. (See Fig. 2.) This manner of supporting the glass obviates the necessity for cutting into the glass by drilling holes or otherwise for the purpose of supporting it and also permits the presentation of a smooth surface without projections or indentations which might catch plaster. A follower 23, carried by the backing member, rests against the upper edge of the glass plate. Preferably, felt padding 23 is placed between the follower and the upper edge of the glass in order to prevent injury to the glass. The glass may be removed by withdrawing the follower block 23 and raising the glass until it is free of the members 19 and 22.

In order to provide the backing member with a flat surface, against which to rest the glass facing, a layer 24 of plastic material is applied to the backing member and spread evenly over the same to eliminate all inequalities presented by the backing member itself. The glass is pressed against the plastic layer and the latter permitted to harden.

This manner of mounting the glass avoids the necessity of machining the inner facing of the backing member to a perfectly flat surface. The hopper side is supported so that the lower edge 25 of the glass plate lies, substantially, in the plane of the upper surface of the bottom sheet 13. The supports 26 for the hopper side are, preferably, sufficiently resilient or flexible to permit the hopper sides to yield or move slightly in case of necessity. Suitable means, not shown, are provided for moving the hopper sides to-

gether or apart to adapt the machine for making plaster board of various widths.

It will be observed that the deck 12 is somewhat narrower than the cover sheet 13 so that the margins 27 of the latter project beyond the edges of the deck 12 and extend beyond the outer face of the glass plate 17. Auxiliary supporting members 28 are provided for each of the hopper sides for supporting these margins of the cover sheet. The inner edges 29 of the auxiliary members are spaced a slight distance from the edges of the deck 12 to allow a certain amount of play or adjustment. The auxiliary supporting members 28 may conveniently comprise an angle bar supported by arms 30, hinged at 31 to brackets or supports 32. The brackets 32 are carried by the hopper sides. Suitable means are provided for causing the supporting members 28 to press the margins 27 of the cover sheet closely against the lower edges of the hopper sides, respectively, and for varying the degree of pressure. Such means may comprise, for instance, a spring 33, a rod 34, and a wing nut 35 associated with the bracket 32 and arm 30. By adjusting the wing nut, the pressure of the member 28 against the margin of the cover sheet and the lower edge of the hopper side may be varied. This construction insures a close joint between the hopper side and the bottom cover sheet, preventing the leakage or escape of plaster but, at the same time, permits the supporting member 28 to yield independently of the deck 12 to relieve automatically congestion and jamming caused by hardened lumps of plaster or imperfections in the paper sheet. Moreover, slight movements of the hopper sides during the operation of the machine do not impair the efficiency of this joint.

As the traveling cover sheet with the plaster thereon reaches the rolls 10 and 11, a top cover sheet 36, running about the top roll, is applied. Preferably, a traveling belt 37 for carrying the plaster board runs over the bottom roll.

Suitable folding devices are provided for folding up the margins of the bottom cover sheet along the outer face of the hopper sides near the forward ends thereof. In the construction shown, these folding devices comprise a member 38, having a beveled face 39 lying in the path of the margin and intended to turn up this margin substantially through a right angle. For a purpose hereinafter explained, the folding device is pivoted at 40 to a block 41, carried between nuts 42 and 43 on a stud 44. The beveled surface 39 is extended around the pivot 40 as a center so that even though the folding device is rotated about its pivot, a beveling folding surface always lies in the path of the margins of the sheet. The folding device is provided with an extension or bar 45, 130

which extends along the folded margin 46 of the paper to a point somewhat beyond the center line of the rolls 10 and 11. A torsion spring 47 is provided for causing the bar 45 to press the folded margin 46 against the outer face of the hopper side to form a close joint and prevent the escape of plaster. (See Fig. 3.) The folding device and the bar 45 may be moved in or out on the stud 44, to permit the necessary adjustments to secure a proper functioning of the apparatus.

The forward end 48 or "point" of the hopper side is provided with a member for reducing the thickness of the hopper side near the point and terminating the same in a relatively thin edge. In the illustrative construction, the member 22, supporting one end of the glass, is constructed and arranged to serve also as the hopper point. This member is preferably made of rust-proof material such as Monel metal and polished, thus presenting a smooth surface to the plaster, upon which the plaster is less likely to adhere.

The inner end 49 of the member 22 is formed to come flush with the inner surface of the glass plate 17 and the outer portion thereof is gradually reduced in thickness by the beveled surface 50 on the rear of the member. A supporting member 51 having an inclined dovetailed recess 52 is secured to the backing member 16 for holding the member 22. The supporting member 51 is carried on the backing member 16 a sufficient distance above the lower edge of the glass plate 17 as not to interfere with the folded margin 46 of the paper. The member 22 is provided with an inclined dovetailed rib 53 arranged to slide within the recess 52 to hold the member securely in place. The surface of the back of member 22 is arranged to come flush with the back surface of the glass 17 as at 54.

The point member of the hopper therefore cooperates to bring the margin 46 of the paper into direct contact with the body 55 of the plaster beyond the extremity 56, without disturbing the plaster body to any material extent.

As illustrated, particularly in Fig. 3, the forward ends of the hopper sides may be supported so that the outer faces 50 of the points lie parallel with the folded margins 46 and with the edges of the plaster board. This in effect makes the inner faces of the hopper sides diverge toward the rolls, the axes of which are indicated at X. The amount of convergence relative to the width of the plaster board is ordinarily slight. In the arrangement shown, the inner face of the hopper side is inclined at an angle of about 10 degrees to the margin of the paper. This angle may be varied to suit particular constructions and requirements.

The arrangement of the hopper sides in

diverging relation tends to stretch the lower cover sheet transversely, preventing the formation of wrinkles in the sheet. However, if desired, the hopper sides may be arranged in parallel relation and the points thereof shaped accordingly.

The manner of mounting the bar 45 permits the latter to yield to relieve congestion, though normally maintaining a close joint, and renders it possible to clean easily the working face of the bar by swinging it about the pivot 40.

A number of conduits 57 are provided along the upper portion of the hopper side for conducting water to the inner face of the hopper side at various points. A flexible tube 58 may be connected with any of these conduits so as to supply water only at the place desired, thus avoiding the thinning down of the plaster mix by an excess of water. The water assists in preventing the plaster from sticking and hardening on the face of the glass plate.

The machine may be adjusted to make plaster board of various widths by removing the deck 12 and supplying another of the desired width. This may be done easily because the deck is supported independently of the hopper sides. The space between the edge 29 of the member 28 and the deck 12 permits such adjustments as are necessary in securing proper operation of the machine. As stated above, for varying the width of the plaster board manufactured by the machine, the hopper sides may be adjusted on the supporting members 26.

In Fig. 4 is illustrated one form of plaster board capable of being made by the form of machine illustrated. In this form of plaster board the top cover sheet extends the entire width of the board, and the folded margins 46 extend substantially to the lower face of the top sheet. Various other types of plaster board edge may be manufactured in this type of machine by making suitable adjustments.

Obviously the invention is not limited to any particular form of construction and the details of the illustrative apparatus may be variously modified. Moreover it is not indispensable that all the features of the invention be used conjointly as they may be used to advantage in various different combinations and subcombinations.

Having thus described my invention, I claim:

1. In plaster board apparatus of the type described the combination with means for supplying a cover sheet, of a hopper construction for confining the plaster and to prevent the flow thereof upon a margin of the sheet comprising a hopper side constructed and arranged to permit the sheet to extend beyond the inner face thereof, and means for maintaining a close joint between

the hopper and the sheet and capable of relieving congestion between said sheet and hopper.

2. In plaster board apparatus, the combination with means for supplying a cover sheet, of a hopper construction for confining the plaster and to prevent the flow thereof upon a margin of the sheet, comprising a hopper side constructed and arranged to permit the sheet to engage the same, and yieldable means, capable of yielding when said cover sheet is wedged against said hopper side.

3. In a plaster board machine, the combination of a support for a traveling cover sheet, a hopper side supported to permit the margin of the cover sheet to pass below the same, and yieldable means capable of yielding automatically to relieve congestion below said hopper side.

4. In a plaster board machine, the combination of a support for a traveling cover sheet, a hopper side supported to permit the margins of the cover sheet to engage the same, and yieldable means associated with said support and capable of yielding to prevent the cover sheet from catching between the hopper side and said support.

5. In a plaster board machine, the combination of a support for a traveling cover sheet, a hopper side supported and arranged to permit the margins of the cover sheet to pass between the same and the support, said support provided with a yieldable portion below said hopper side capable of yielding to prevent the cover sheet from catching between said support and the hopper side.

6. In a plaster board machine, the combination of a support for a traveling cover sheet, a hopper side supported to permit the margins of the cover sheet to pass below the same, said support provided with a yieldable portion below said hopper side for pressing the cover sheet against the hopper side and capable of yielding to relieve accidental congestion.

7. In a plaster board apparatus, the combination of a support for the bottom cover sheet, hopper sides supported to permit the margins of the cover sheet to pass under the same, movable supporting members below said hopper sides, respectively, and resilient means for forcing the same toward the hopper sides to press the cover sheet snugly against said hopper sides.

8. In a plaster board apparatus, the combination of a support for the bottom cover sheet, hopper sides supported to permit the margins of the cover sheet to pass under the same, movable supporting members connected with said hopper sides, respectively, and positioned below the same, and springs for drawing said members toward said hopper sides for pressing the margins of the cover sheet snugly against said hopper sides.

9. In plaster board apparatus, a hopper side comprising in combination a backing or supporting member, a glass facing having beveled end portions converging downward, and fastening members carried by said backing member and engaging said converging end portions for supporting said facing.

10. In plaster board apparatus, a hopper side comprising in combination a backing or supporting member, an imperforate glass facing having portions of the end edges converging downwardly, and fastening members carried by said backing member and engaging said converging portions for supporting said facing.

11. In plaster board apparatus, a hopper side comprising in combination a backing or supporting member, a glass facing for said backing and means for removably securing said facing to said backing.

12. In plaster board apparatus a hopper side comprising in combination a backing or supporting member, a smooth rust-proof facing for said backing and means for removably securing said facing to said backing.

13. In plaster board apparatus a hopper side comprising in combination a backing or supporting member, a smooth rust-proof facing for said backing of material to which plaster does not readily adhere, and means for removably securing said facing to said backing.

14. In apparatus for making plaster board, hopper construction comprising in combination a hopper side constructed and arranged to confine the plaster, and a movable point associated with said hopper construction and capable of yielding laterally to relieve congestion.

15. In apparatus for making plaster board, hopper construction comprising in combination a hopper side for confining the plaster, a device for said hopper construction constructed and arranged to cooperate with said hopper side for forming the edge of the plaster board, and means for mounting said device to permit it to yield.

16. In apparatus for making plaster board, the combination of a hopper side supported to permit the margin of a cover sheet to pass under the same, and a folding device for turning up the margin of the paper against the outer face of the hopper side.

17. In apparatus for making plaster board, the combination of a hopper side supported to permit the margin of a cover sheet to pass under the same, and a folding device for turning up the margin of the paper against the outer face of the hopper side, said hopper side having the end thereof beveled.

18. In apparatus for making plaster board the combination of a hopper side

supported to permit the margin of a cover sheet to pass under the same, a folding device for turning up the margin of the paper against the outer face of the hopper side, and means for pressing the folded margin against said face.

19. In apparatus for making plaster board, the combination with a support for a traveling cover sheet, of a hopper side constructed and arranged to cooperate to confine the plaster, a folding device for folding the margin of the sheet against said hopper side, and means for yieldably pressing said folded margin against the hopper side.

20. In apparatus for making plaster board, the combination with means for applying a cover sheet to a plaster body, of a folding device for folding the margin of the cover sheet substantially at right angles to the sheet and having yieldable means for pressing against the folded margin.

21. In apparatus for making plaster board, the combination with the usual spreading rolls of a hopper side supported to permit the margin of a cover sheet to pass under it, a movable folding device located in the path of the sheet margin and adapted to fold the latter against the outer face of the hopper side, said folding device having an extension bearing against the folded margin and extending beyond the end of the hopper side.

22. In apparatus for making plaster board, the combination with the usual spreading rolls of a hopper side having a point extending to said rolls and arranged to permit the margin of a cover sheet to pass under it, a folding device pivotally mounted and located in the path of the cover sheet margin for folding up the margin along the outer side of said hopper side, said folding device having a member running along the folded margin and extending beyond the end of the hopper side, and a spring associated with said member for pressing the latter against the folded margin and capable of permitting said member to yield.

23. In apparatus for making plaster board, the combination with the usual spreading rolls of a hopper side having a point extending to said rolls and arranged to permit the margin of a cover sheet to pass under it, a folding device pivotally mounted and located in the path of the cover sheet margin for folding up the margin along the outer side of said hopper side, and means for permitting the adjustment of said folding device toward or from the margin of the sheet.

24. In apparatus for making plaster board, the combination with the usual spreading rolls of a hopper side, having a point extending to said rolls and arranged

to permit the margin of a cover sheet to pass under it, a folding device pivotally mounted and located in the path of the cover sheet margin for folding up the margin along the outer side of said hopper side, said folding device having a member running along the folded margin and extending beyond the end of the hopper side, and a spring associated with said folding device for causing said member to press the folded margin of the sheet against the outer face of said hopper side, said folding device having its folding surface formed to permit the movement of the former about its pivot without interfering with the folding operation.

25. In apparatus for making plaster board, the combination of a supporting deck for a traveling cover sheet, a hopper side supported independently of said deck and arranged to permit the margin of the cover sheet to pass under the hopper side, and an auxiliary supporting member for the margin of the sheet carried by the hopper side and independent of said deck.

26. In apparatus for making plaster board, the combination of a supporting deck for a traveling cover sheet, a hopper side resiliently supported beyond the edges of said deck and arranged to permit the margin of the sheet to pass under the same, and an auxiliary supporting member for supporting the margin of said sheet and carried by said hopper side independently of said deck.

27. In apparatus for making plaster board, the combination with the spreading rolls and a support for a traveling cover sheet, of a hopper side supported so as to permit the margin of the sheet to pass under it, means for folding up the margin against the outer face of the hopper side, and a "point" for said hopper side of gradually decreasing thickness, whereby the folded margin comes gradually into contact with the plaster body.

28. In apparatus for making plaster board, the combination with means for supplying plaster to a traveling cover sheet of hopper sides for confining the plaster to definite portions of the cover sheet, and means for supplying liquid at various points of the working faces of the hopper sides, as desired.

29. In apparatus for making plaster board, the combination with means for supplying plaster to a traveling cover sheet of hopper sides for confining the plaster to definite portions of the cover sheet, said hopper sides provided with a plurality of conduits by means of which water may be supplied to various portions of the working face of the hopper sides, as desired.

30. In apparatus for making plaster board, hopper construction comprising a backing

member, a layer of plastic material, or the like on said backing to form a flat surface, and a smooth glass facing on said surface and supported by said backing.

- 5 31. In apparatus for making plaster board, a hopper side comprising in combination, a backing member, a facing member, a "point" for said hopper side secured to said backing member and supporting one end of
10 said facing member, said "point" being flush with the opposite surfaces of said facing member and decreasing in thickness toward its forward extremity for the purpose described.
- 15 32. In plaster board apparatus, the combination of a support for the bottom cover sheet, hopper sides supported to permit the margin of the cover sheet to pass under the same, movable supporting members hinged
20 to said hopper sides, respectively, and positioned below the same, springs for drawing said members toward said hopper sides for pressing the margins of the cover sheet snugly against said hopper sides, and means

for adjusting said spring so as to regulate 25 the pressure of said members against the margins of the hopper sides.

33. In apparatus for making plaster board, the combination comprising a support for a traveling cover sheet and a pair of hopper 30 sides for confining the plaster upon the cover sheet, said hopper sides being arranged in diverging relation in the direction of travel of the cover sheet.

34. In apparatus for making plaster board, 35 the combination comprising a support for a traveling cover sheet and a pair of hopper sides engaging said cover sheet for confining the plaster upon the cover sheet, the "points" of which are beveled on their outer 40 faces to a relatively thin edge, said hopper sides being arranged in diverging relation with the beveled faces of said points parallel with the direction of travel of the cover sheet.

In testimony whereof, I have signed my 45 name to this specification.

CLARENCE W. UTZMAN.