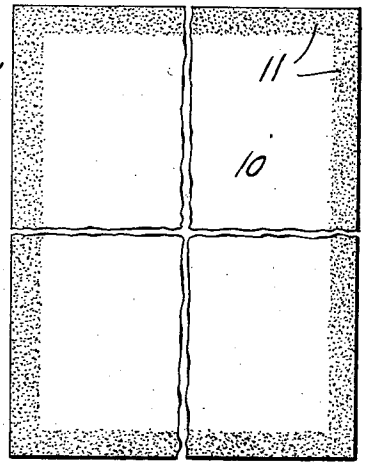
Aug. 3, 1937. J. FLETCHER 2,089,087

WALLBOARD

Filed Aug. 15, 1935

Fig. 1.



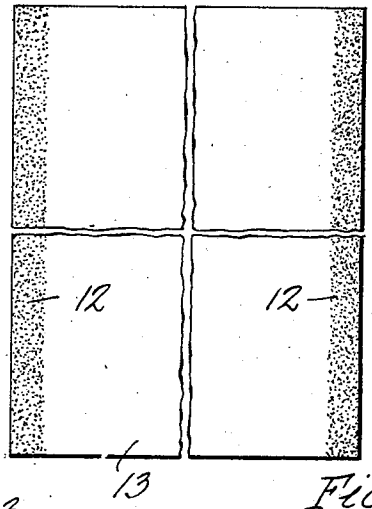


Fig. 2.

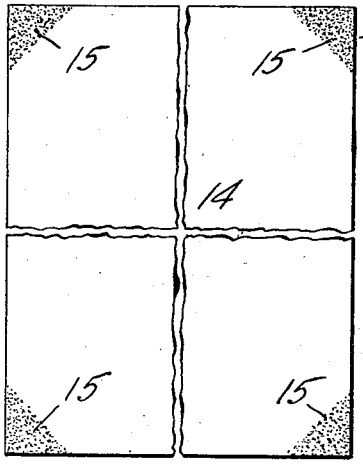


Fig. 3.

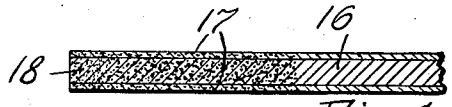


Fig. 4.

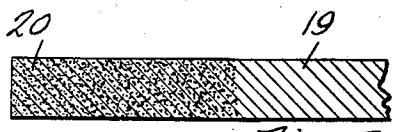


Fig. 5.

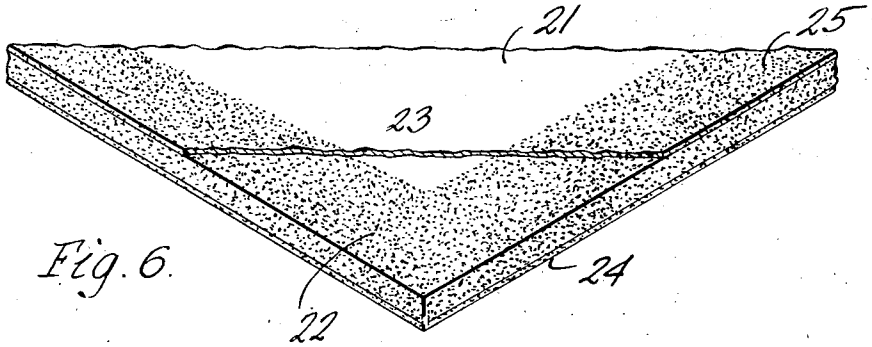


Fig. 6.

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Patented Aug. 3, 1937

2,089,087

UNITED STATES PATENT OFFICE

2,089,087

WALLBOARD

John Fletcher, Kenmore, N. Y., assignor to Plastergon Wall Board Company, Buffalo, N. Y., a corporation of New York

Application August 15, 1935, Serial No. 36,358

7 Claims. (Cl. 154—45.9)

This invention relates to wallboard and particularly to wallboard intended for use in the construction of walls.

In the handling of various types of wallboard, great care must be exercised to prevent damage to the edges and corners of the sheets, because if a board is seriously injured along an edge or corner, it reduces its value and frequently requires cutting off marginal edges of the board, thereby limiting its usefulness and beneficial effect. Also in nailing gypsum board, the gypsum frequently cracks or breaks adjacent the marginal edges or corners through which the nails are driven, which weakens the attachment of the board to the wall. When a number of sheets of wallboard are attached to a wall in edge to edge relation, the inevitable crack between the adjacent edges of the board tends to vary in size at different times, because of the shrinkage and expansion of the board with temperature and humidity changes. This variation in the crack makes it difficult or impossible to keep the crack filled permanently when crack fillers are employed, and also makes it very difficult or impossible to apply wall paper across the cracks without danger of the paper cracking or splitting along the crack.

One object of the invention is to provide an improved wallboard, with which the danger and liability of damage to the edges and corners thereof in handling will be reduced to a minimum; with which variation in the cracks between adjacent edges of the board, due to the shrinkage and expansion of the board, will be materially reduced or lessened; and which will be relatively simple and inexpensive.

Another object of the invention is to provide an improved method of making such wallboard, which will require a minimum of apparatus, with which the required apparatus will be simple, and which will require a minimum of additional operations.

Other objects and advantages will be apparent from the following description of several embodiments of the invention, and the novel features will be particularly pointed out in the appended claims.

In the accompanying drawing:

Fig. 1 is a plan of a sheet of improved wallboard constructed in accordance with this invention, and illustrating one embodiment thereof.

Fig. 2 is a similar plan of another sheet of wallboard also constructed or treated in accordance with this invention, and illustrating another embodiment thereof.

Fig. 3 is a similar plan of another sheet of wallboard, also constructed and treated in accordance with this invention and illustrating still another embodiment thereof.

Fig. 4 is a sectional elevation through an edge portion of a sheet of wallboard which has been treated in accordance with this invention and which illustrates another embodiment of the invention, the type of board being illustrated as of either the laminated type or the gypsum filler type.

Fig. 5 is a similar sectional elevation through an edge portion of a sheet of open pore wallboard, to show the edge protection thereof in accordance with this invention; and

Fig. 6 is a perspective of a corner of a sheet of gypsum board with a portion of one liner broken away, which has been impregnated or stiffened along its marginal edges as in Fig. 1.

In accordance with this invention, I have discovered that the variations in the crack between the adjacent edges of wallboard in a wall construction may be very materially reduced by hardening or stiffening or increasing the strength and rigidity of the sheets of wallboard along the marginal zones. The best results are obtained by stiffening or hardening the entire marginal zone of each sheet of board, such as along its entire periphery, that is along all of its edges, leaving the interior zone which is framed by said marginal zone, of lesser rigidity, yet desirable, but somewhat less satisfactory, results may be obtained by similarly treating only opposite edge zones of a sheet of such board, leaving the other opposite edges untreated. Some advantages may also be obtained merely by similarly treating only the corners of a sheet of a wallboard, leaving the remainder of the board substantially untreated or of less rigidity and strength than the treated portion. The depth of penetration or degree of stiffening may vary from a relatively narrow zone along the edges where substantially only the edges of the board are treated to protect them, to a nailing zone which may be as wide as six inches or more, when one desires to reduce variations in the crack between adjacent edges of sheets of such board, as applied to a wall construction.

Referring particularly to Fig. 1, a sheet of wallboard 10 of any suitable type is impregnated or treated along its entire marginal zone 11, that is, around its entire margin or periphery, with a suitable liquid stiffening or protecting agent. In the broadest aspects of the invention any liquid impregnating agent which may be subsequently hardened, may be employed, but among those which are particularly satisfactory may be mentioned the urea-aldehyde thermo-setting resins, the phenol aldehyde thermo-setting resins, the polybasic acid-polyhydric alcohol thermo-setting resins and starch. Starch may be used, such as either tapioca starch or cornstarch, which has a prior treatment or conversion to produce an adhesive starch. This prior treatment includes drying the starch, and then either oxidizing with an

oxidizing agent such as barium peroxide or else treating with enzymes whose function is that of a catalyst for conversion of the starch in part to dextrine. The starch in this form is then dissolved in water and applied in the same manner as the urea-aldehyde type resin syrup and other agents.

If the wallboard is of the gypsum filled type, in which a plate-like body of gypsum is covered on opposite faces with paper liners, then the impregnating agent is preferably a water miscible agent, and the urea-aldehyde, thermo-setting resin is very satisfactory for this purpose because it is water miscible. The stiffening agent should also preferably be approximately colorless so as not to objectionably color the wallboard.

The stiffening agent may be applied to the edge zones of the wallboard by dipping the edge zones into a container containing the liquid impregnating or stiffening agent, the dipping being maintained until the liquid has penetrated to the desired distance from the edge, but this agent is not applied to the interior area or zone, from face to face, of the board between the impregnating and marginal zones. After one edge or marginal zone has been impregnated or penetrated by the stiffening agent, other edges may be dipped in a similar manner, or the impregnating agent in liquid form may be applied to the desired zones by spraying brushing or in any other suitable manner. After the marginal zones of the board have been impregnated or treated with this liquid stiffening agent, the stiffening agent is hardened. This hardening may be accomplished by allowing the board to stand if a drying operation is sufficient to cause the hardening, but this drying may be accelerated by heat treatment.

If the stiffening agent is of the thermo-setting resin type, which is the preferable type, then the impregnated or treated board may be placed in an oven or kiln in which the temperature is sufficient to harden the resin which has penetrated the wall board. For example, when a thermo-setting, urea-aldehyde type of resin is employed as a stiffening agent, it is preferably applied in syrup form, and the temperature of the kiln or oven in which the treated board is placed may vary from 100 to 300° F. for from fifteen minutes to two hours, or until the resin has hardened to the desired extent. It will be noted that by treating and stiffening only the marginal zones of the board, the edges will be strengthened and stiffened so that there is less danger of the edges being damaged in the handling of the board or sheets, and the corners are less likely to be broken off in handling or when nailing the board to the wall.

By this treatment the marginal zones of each sheet of board will have considerably greater rigidity than the interior zones or areas which are framed by the treated marginal zones, and hence the stresses arising from any expansion and contraction in any sheet of wallboard will be compensated for or taken up in the unimpregnated or untreated interior zone, because that untreated zone or section of the board will have less rigidity and elasticity and can therefore expand or contract and absorb stresses without materially varying the size of the encircling or impregnated zone. It will be understood, of course, that when the board is applied to a wall it is attached commonly by driving nails into the wall structure through the marginal or edge zones which may be called nailing zones and occasionally through the interior area of the sheet.

If sheets of wallboard which have been impregnated along the edges as shown in Fig. 1, are brought edge to edge and attached through the nailing zones adjacent the edges permanently to the wall structure, the crack between the adjacent edges will vary only slightly as time passes, because the hardened or stiffened edges are firmly attached to the wall structure and the stresses due to the expansion and contraction in the sheet will be taken up or compensated for in the relatively more resilient or compressible area which is the interior untreated zone or area, that is, the area which is bounded by the treated marginal zone.

In the embodiment of the invention shown in Fig. 2, only two opposite edge portions or nailing zones 12 of a sheet 13 of wallboard are treated with this stiffening agent, and when such opposite, stiffened edge portions or zones are anchored by nails, or other suitable or similar attaching means, to the wall structure, the stiffened edge zones will resist, directly, all stresses in the sheet that are set up by expansion and contraction of the sheet in a direction between such opposite edges, and the relatively stiff edges will also resist, although to a lesser extent, the stresses from the expansion and contraction of the interior of the sheet in a direction parallel to the stiffened edges. Thus many of the advantages of the treated sheet of Fig. 1 may be obtained, but the variations in the cracks between the untreated edges of abutting sheets may be greater in the type of treated board shown in Fig. 2 than in Fig. 1.

In Fig. 3 still another embodiment of the invention is illustrated in which a sheet 14 of wallboard has its corners dipped into, or otherwise treated with, the impregnated agent to form stiffened corner zones 15 as shown by stippling. With this construction, since the four corners of the sheet are accurately located and secured by suitable fastening means at the corners, all expansion and contraction stresses of the interior area of any sheet will be very materially resisted by the anchorage of the corners. Hence the formation of cracks between adjacent edges of adjacent sheets will be reduced over a similar construction using entirely untreated wallboard. Where the corners only are treated, there is less protection to the edges, and there may be some variations in the edges of the sheets between the anchored corners during the expansion and contraction of the sheet, such as is caused by temperature and humidity changes, yet the stresses set up by such expansion and contraction will be absorbed to a considerable extent in the interior untreated zone which is of greater resiliency and softness than the treated corner zones.

In the forms of the invention shown in Figs. 1 to 3, the sheets of wallboard may be of any of the usual types, such as laminated or fibrous wallboard, open pore insulating board, and board having a gypsum filler between paper surface liners, because the treatment may be substantially the same in all cases. In the case of the type of board having the gypsum filler, however, the impregnation in the gypsum filler along the marginal zones thereof may be made either before or after paper liners are applied thereto, and in some cases, such as for protecting the edges and corners, the agent may be incorporated in the filler while the filler is plastic or is being mixed.

In Fig. 4, the treatment of an edge zone of a sheet of board is illustrated as applied to the type

of board having a central layer 16, which may be either of gypsum or fiber, and covered on both faces by paper liners 17. The impregnated edge zone 18 is of substantial depth or width, both for the protection of edges and corners against injury and to provide a rigid zone through which the nails or other fastening means may be passed. Preferably the zones are considerably wider than shown in Fig. 4, so as to provide a marginal edge zone of several inches width through which nails may be passed in fastening the sheets to a wall construction, and still allowing for some trimming in order to fit the sheet to spaces of different sizes.

In Fig. 5, a sheet 19 of open pore insulating board is illustrated as having an edge zone 20 thereof impregnated with the stiffening agent in order to protect the edge against injury, and to provide a marginal zone through which the fastening means or nails may be passed. The impregnated zone is preferably several inches in width in this type of board, the same as explained for Fig. 4.

In Fig. 6, I have illustrated a corner of a sheet 21 of gypsum board in which the gypsum filler 22 and liners 23 and 24 are impregnated along all of the edges for a substantial width, in order that the edges and corners will be protected against injury, and also to provide a marginal zone 25 of greater rigidity than the interior through which the nails or other fastening means may be passed.

It will be understood that various changes in the details and materials, which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention as explained in the appended claims.

I claim as my invention:

1. An improved wallboard in sheet form, having its interior zone, from face to face, framed by a marginal nailing zone which has been impregnated with a stiffening agent to increase its strength and rigidity over that of said interior zone, whereby when sheets of said board are nailed through said nailing zone to a structure, with edges of the sheets approximately abutting one another, stresses set up in said sheets by normal expansion and contraction of the material of the board will be largely compensated for in said interior zones and any spaces between adjacent edges of said nailing zones of different sheets will remain approximately unchanged.

2. An improved wallboard in sheet form, composed largely of organic fibres and having its interior zone, from face to face, framed by a marginal nailing zone which has been impregnated with a stiffening agent to increase its strength and rigidity over that of said interior zone, whereby when sheets of said board are nailed through said nailing zone to a structure, with edges of the sheets approximately abutting one another, stresses set up in said sheets by normal expansion and contraction of the material of the board will be largely compensated for in said interior zones and any spaces between adjacent edges of said nailing zones of different sheets will remain approximately unchanged.

3. An improved wallboard in sheet form, having nailing zones thereof impregnated with a stiffening agent to stiffen and strengthen said zones, and also having its other zones, between said impregnated zones, of lesser stiffness and elasticity than said nailing zones, whereby when sheets of said improved board are nailed through said nailing zones to a structure, with edges of adjacent sheets approximately abutting one another, stresses set up in said sheets by expansion and contraction forces on the material in said sheets will be largely compensated for by the interior zones of the sheets and any spaces between adjacent edges of adjacent sheets will remain of approximately the same width.

4. An improved wallboard which comprises a sheet of wallboard, uniform in composition from edge to edge but whose nailing marginal zones at opposite edges thereof are stiffened and strengthened by an added impregnating agent, the interior zone of said board between said marginal zones being of lesser stiffness and elasticity than the nailing zones, whereby when sheets of said improved board are nailed through said nailing zones to a structure, with edges of adjacent sheets approximately abutting one another, stresses set up in said sheets by expansion and contraction forces on the material in said sheets will be largely compensated for by the interior zones of the sheets and any spaces between adjacent edges will remain of approximately the same width.

5. An improved wallboard in sheet form, having nailing marginal zones at opposite edges thereof stiffened and strengthened by a hardened, thermal setting resin, and also having an interior zone between said marginal zones of lesser stiffness and elasticity than said nailing zones, whereby when sheets of said improved board are nailed through said nailing zones to a structure, with edges of adjacent sheets approximately abutting one another, stresses set up in said sheets by expansion and contraction forces on the material in said sheets will be largely compensated for by the interior zones of the sheets and any spaces between adjacent edges will remain of approximately the same width.

6. An improved wallboard in sheet form, having nailing marginal zones at opposite edges thereof stiffened and strengthened by a hardened urea-aldehyde type of thermal setting resin, and also having an interior zone between said marginal zones of lesser stiffness and elasticity than said nailing zones, whereby when sheets of said improved board are nailed through said nailing zones to a structure, with edges of adjacent sheets approximately abutting one another, stresses set up in said sheets by expansion and contraction forces on the material in said sheets will be largely compensated for by the interior zones of the sheets and any spaces between adjacent edges will remain of approximately the same width.

7. An improved wallboard in sheet form, composed largely of organic fibres and having nailing marginal zones at opposite edges thereof impregnated with a stiffening agent to stiffen and strengthen said zones, and also having an interior zone between said marginal zones of lesser stiffness and elasticity than said nailing zones, whereby when sheets of said improved board are nailed through said nailing zones to a structure, with edges of adjacent sheets approximately abutting one another, stresses set up in said sheets by expansion and contraction forces on the material in said sheets will be largely compensated for by the interior zones of the sheets and any spaces between adjacent edges of adjacent sheets will remain of approximately the same width.

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