# United States Patent

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[72] Inventor **Daniel A. Winkowski**
**Tonawanda, N.Y.**



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[73] Assignee **National Gypsum Company**
**Buffalo, N.Y.**


[54] **PREDECORATED GYPSUM BOARD**
**10 Claims, 4 Drawing Figs.**


[52] **U.S. Cl.** ..... **161/119,** 52/309, 52/311, 117/38, 117/45, 156/41, 156/45, 161/41, 161/124, 161/413
[51] **Int. Cl.** ..... **B32b 3/00**
[50] **Field of Search** ..... 52/309, 311, 316; 117/11, 38, 44, 45, 104, 12, 8; 156/40, 41, 45; 161/41, 43, 44, 102–108, 116, 119, 124, 413



[56] **References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 1,180,516 | 4/1916 | McIndoe | 161/119 |
| 1,947,459 | 2/1934 | Casto | 161/413 UX |
| 2,013,865 | 9/1935 | Sloan | 161/5 |
| 2,137,896 | 11/1938 | Marsh | 161/121 X |

FOREIGN PATENTS

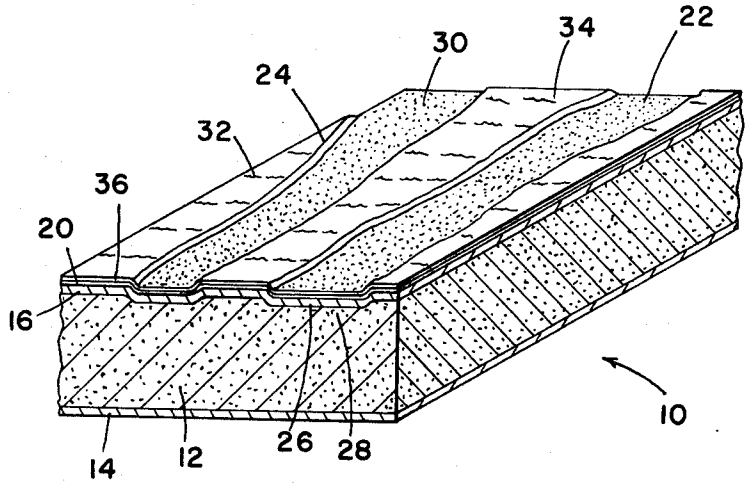
| | | | |
|---|---|---|---|
| 688,763 | 6/1964 | Canada | 161/116 |



*Primary Examiner*—William A. Powell
*Attorney*—Robert F. Hause



**ABSTRACT:** Predecorated, washable gypsum board having a plastic base film throughout the front surface and an embossed, printed design extending into the front surface.

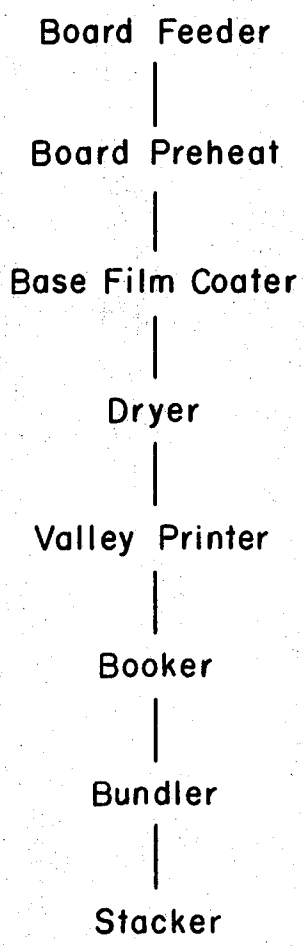



Fig. 1

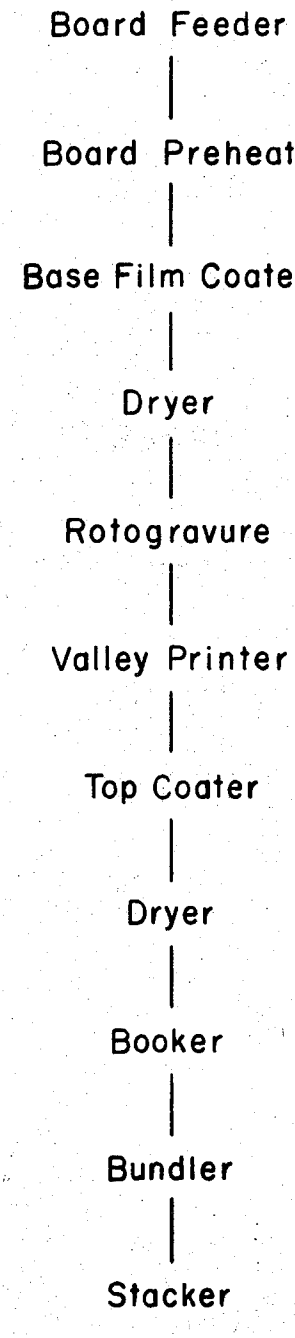



Fig. 2

INVENTOR.
Daniel A. Winkowski
BY
Robert F. Stamer
ATTORNEY

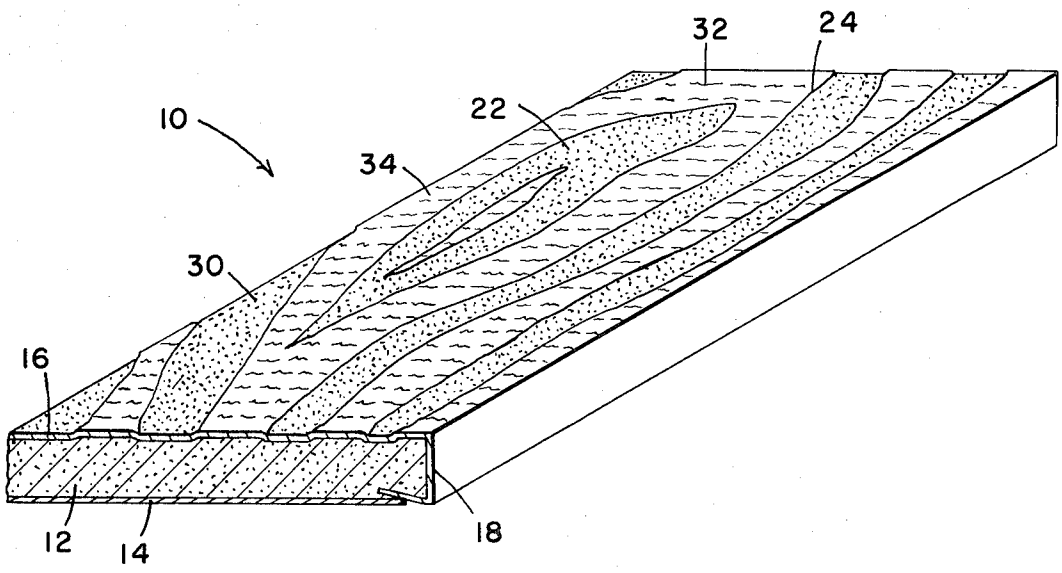



Fig. 3

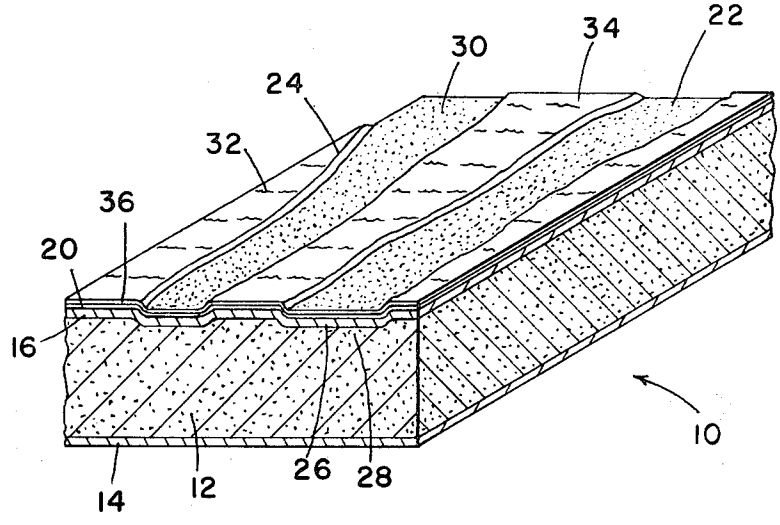



Fig. 4

INVENTOR.
Daniel A. Winkowski
BY
Robert F. Hanes
ATTORNEY

# PREDECORATED GYPSUM BOARD

This invention relates to predecorated gypsum wallboard and to methods of making the same.

Gypsum wallboard is commonly used, in any of several available forms, in constructing interior walls and ceilings. In its most common form, a cream-colored face paper forms the wall exterior, the joints are covered by a setting or drying cementitious material, and the resultant substantially monolithic surface is painted. The cream color of the face paper is provided by the choice of fibers used in the surface ply in its manufacture, and/or dyes incorporated therein.

Other forms of gypsum board have been developed and marketed, with the aim of reducing the labor required in constructing, finishing and decorating the wall. These other forms all involved substantial increases in the product cost, and met with little success unless they also incorporated a relatively maintenance-free surface, providing the justification for the increase, and in such case the increase in cost has always been such that it can hardly be justified, except in substantial quantities, in commercial construction, where subsequent maintenance costs are of substantial importance.

A predecorated, low installation cost, substantially maintenance-free gypsum board which can justify its increase in cost when used in home construction, particularly prefabs, has long been sought and it is the object of the present invention to provide such a gypsum board.

It is a further object to provide a novel method of decorating and forming a relatively maintenance-free gypsum wallboard.

These and other objects and advantages of the invention will be more readily apparent when considered in relation to the preferred embodiments as set forth in the specification and shown in the drawings in which:

FIG. 1 is a flow diagram of a basic form of the method of the present invention.

FIG. 2 is a flow diagram of a modified method of the present invention.

FIG. 3 is an isometric cross-sectional view of a predecorated gypsum board made by the method of the flow diagram of FIG. 2.

FIG. 4 is an enlarged segment of the board of FIG. 3.

Referring to FIGS. 3 and 4, there is shown a gypsum board **10** having a set gypsum core **12**, a back cover paper **14** and a face cover paper **16**. Face paper **16** has an edge portion **18** which extends around the board side edge and terminates on the back face.

Face paper **16** has thereon a thin, pigmented acrylic base film **20**, of a uniform thickness of about 0.001 inch, extending therethroughout, providing a strong scrub resistant protection to the paper **16**.

Gypsum board **10** has a plurality of embossed, depressed areas **22** disposed in spaced preselected patterns substantially throughout the face **24** including depressed portions **26** of face paper **16** and film **20**, and compressed depressions **28** forced into the portions of core **12** immediately under the paper depressed portions **26**.

Substantially throughout all of the depressed portions **26** there is a thin, uniform, pigmented valley printed ink coating **30** of a thickness of about 0.001 inch, coating **30** being particularly disposed throughout all of the lowest surfaces within the depressed portions as a result of having been printed thereon by the same means which was used to depress the depressed portions **26**.

Gypsum board **10** may also, in accordance with the invention, include thin, pigmented, rotogravure-printed patterns **32** on portions or on all of the undepressed portions **34** between depressed portions **26**. In the embodiment of FIG. **4**, the rotogravure-printed patterns **32** are on only part of the total area of the undepressed portions **34**.

Throughout the entire area of face **24** there may be disposed a top coating **36** of clear unpigmented acrylic or lacquer.



Gypsum board **10** is made by first forming the gypsum core **12** between the back paper **14** and face paper **16**, on a standard wallboard machine, with both back paper **14** and the face paper **16** being flat throughout the respective back side and face side of the board. The back paper **14** and face paper **16**, as supplied to the forming step, are standard gypsum board papers of about 0.020-inch thickness and most commonly made up of about eight laminated plies of about 0.002 inch to 0.003 inch, on a cylinder paper machine. The paper may be folded to a square edge formation as shown in FIG. **3**, or a beveled edge or any other desired edge formation. The core **12** is formed from an aqueous settable gypsum slurry, which hardens by a setting hydration reaction, and the wallboard is subsequently dried in a high-temperature board dryer.

Subsequent to removal of the dried, partially finished board from the dryer, the board is passed through a base coater wherein an acrylic film-forming liquid is spray applied at a wet rate of about 14 grams per square foot. The base coater preferably comprises a traversely airless spray gun, spraying a coating of film-forming liquid at a rate of about 4 gallons per thousand square feet of board, including wasted spray. This acrylic film-forming liquid is preferably of relatively high pigment to vehicle concentration. Subsequent to application, the acrylic film-forming liquid is allowed to undergo a setting reaction, which may be accelerated by radiant heat, prior to entering a high-temperature convection dryer, or the film may be set while being dried in the convection dryer. A dryer temperature of from 300° F. to 500° F. will require at least 2 minutes for substantially complete drying.

Immediately after drying, the film covered board is valley printed, a process wherein a printing roll, having relatively highly raised printing surfaces, which are suitably etched to hold ink, is used to simultaneously depress and print preplanned depressed areas **22** with the valley-printed ink coating **30**. By valley printing immediately after drying, the base film **20** is depressed in the preplanned depressed areas **22** prior to a brittle condition of the film having developed and, secondly, the face paper **16** is depressed in the preplanned depressed areas **22** while in a relatively more flexible, deformable condition produced by the high-temperature softening of the paper fibers.

The valley printing has been found to produce very sharp and distinct designs, with permanent depressions, in the face of the gypsum board, which surprisingly lack any significant damage to the structural integrity of the board, when depressions of from 0.001 inch up to about 0.020 inch are formed.

The completed gypsum board **10**, is packaged by first placing two boards face to face by using an apparatus known as a booker. The two boards are then bundled by applying an edge tape over the edges and adhered to the edge portion of the back face of each of the two boards. Bundled board is then stacked, and warehoused or shipped.

The above process is shown in a Flow Diagram in FIG. **1**. The Flow Diagram of FIG. **2** has two modifications, each of which, or both, can be added to the process of the invention.

A design may be printed over the base film, which in the final product will be disposed throughout the board face **24** except where it may be hidden by the valley-printed ink coating **30**. This design is provided by the rotogravure-printed pattern **32**. The rotogravure printing is preferably carried out immediately prior to the valley printing so that where there may be some overlap, there will be no gap as would result if the rotogravure printing were carried out subsequent to the valley printing. The insertion of the rotogravure printing step just prior to the valley printing step does not increase substantially the time between the base film drying step and the valley printing step.

The other modification included in the Flow Diagram of FIG. **2** is the inclusion of the application of the top coating **36**, with its essential related dryer step. The clear top coating **36** provides a protective film, further enhancing the maintenance free character of the predecorated wallboard.

Having completed a detailed disclosure of the preferred embodiments of the invention, so that others may practice the same, I contemplate that variations may be made without departing from the essence of the invention.

I claim:

1. A paper-covered gypsum-core predecorated wallboard comprising a unitary core of set gypsum completely enclosed on the two board faces and the two side edges with paper, including a back cover paper on the board back side and a face cover paper on the board face side, said wallboard having a predecoration throughout said board face side comprising a substantially uninterrupted film of pigmented water resistant plastic, providing a scrub-resistant film which protects the entire extent of said face cover paper, a plurality of depressed areas disposed in preselected spaced patterns substantially throughout the extent of said face cover paper, said depressed areas having a pigmented coating coextensive therewith, said pigmented coating being distinguishable from said pigmented plastic film disposed thereunder, whereby said board face side has a complementary design therethroughout produced identically of both depressed areas and pigmented coatings disposed therewithin.

2. A predecorated wallboard as defined in claim 1 wherein said uninterrupted plastic film is an acrylic.

3. A predecorated wallboard as defined in claim 2 wherein said acrylic film has a thickness of about 0.001 inch.



4. A predecorated wallboard as defined in claim 1 wherein said pigmented coating in said depressed areas has a thickness of about 0.001 inch.

5. A predecorated wallboard as defined in claim 3 wherein said pigmented coating in said depressed areas has a thickness of about 0.001 inch.

6. A predecorated wallboard as defined in claim 1 wherein said face cover paper has a thickness of about 0.020 inch and said depressed areas are depressed about 0.001 to 0.020 inch in depth.

7. The method of making a paper-covered gypsum-core predecorated wallboard comprising the steps of applying a substantially uniform film of a pigmented plastic resin, at a web rate of about 14 grams per square foot, throughout the face side of a substantially smooth paper-faced, gypsum wallboard, substantially drying said resin film, and subsequently depressing patterned areas of said face side to a depth of about 0.001 to 0.020 inch while simultaneously applying a pigmented coating only in said patterned areas.

8. The method of claim 7 wherein said plastic film is an acrylic.

9. The method of claim 7 wherein said pigmented coating is about 0.001 inch thick.

10. The method of claim 8 wherein said pigmented coating is about 0.001 inch thick.

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