Jan. 30, 1934. J. W. LEDEBOER 1,944,895

CORRUGATED SHEATHING AND PROCESS OF FORMING SAME

Filed March 11, 1931

Fig. 1.

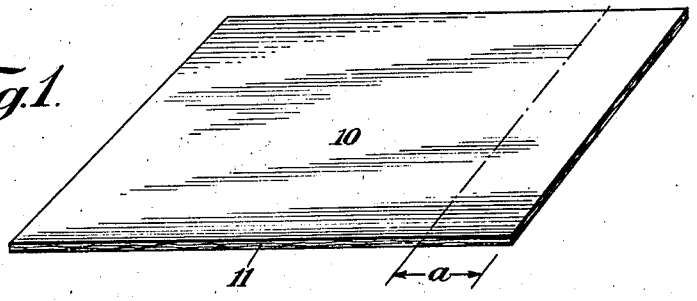
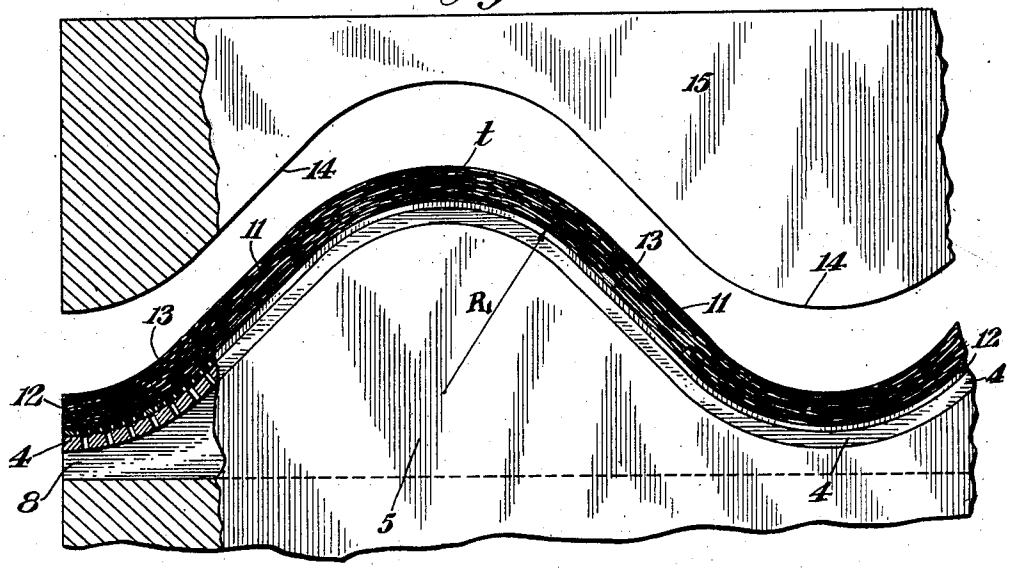


Fig. 2.



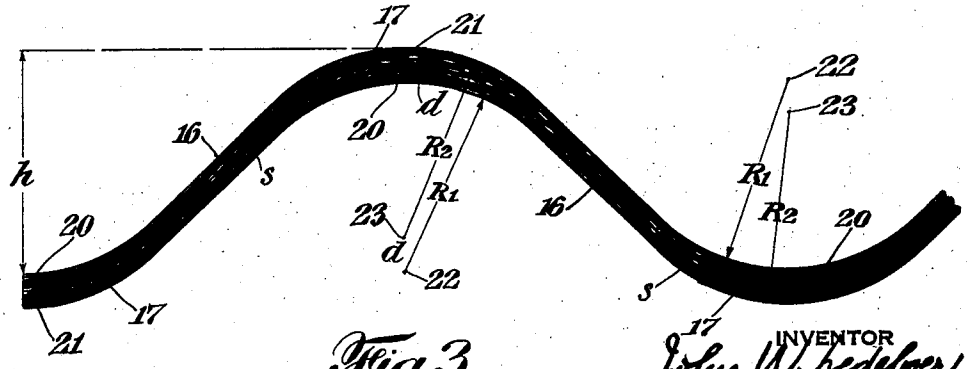


Fig. 3.

INVENTOR
John W. Ledeboer
BY
Edwards, Bauer & Lee
ATTORNEYS

Patented Jan. 30, 1934 1,944,895

UNITED STATES PATENT OFFICE

1,944,895

CORRUGATED SHEATHING AND PROCESS OF FORMING SAME

John W. Ledeboer, Ambler, Pa., assignor to Ambler Asbestos Shingle & Sheathing Company, a corporation of Pennsylvania

Application March 11, 1931. Serial No. 521,773

5 Claims. (Cl. 154—33)

This invention relates to corrugated sheathing and particularly to such sheathing in composition form comprising, for instance, cement and fibrous material such as asbestos.

The object of the invention is to provide such sheathing in light strong form with relatively deep corrugations.

Further objects of the invention, particularly in the method of the formation of the sheathing will appear from the following specification taken in connection with the accompanying drawing in which

Fig. 1 is a perspective view of the sheet as originally formed.

Fig. 2 is a diagrammatic sectional view of a portion of the corrugating dies to form the sheet into final shape, and

Fig. 3 is a sectional view of a portion of the final corrugated sheathing.

In the process of this invention the sheet 10 is first formed flat and of substantially uniform thickness and with its surfaces plane, the sheet being of extra width a in a direction across the corrugations. Preferably the sheet will be made by the Hatschek process, accumulating a series of relatively thin layers as parallel laminations, or by any other process disposing or matting the fibres 11 in the general direction of the plane of the sheet as indicated, and with a composition sufficiently diffuse to permit compacting by pressure at localized sections when the water content is permitted to drain away from one of the surfaces.

This freshly formed sheet 10 in plastic "green" condition is then preformed over a filter screen 12 forming a die as shown in Fig. 2, the surface 13 of the screen 12 being accurately contoured to exactly fit the lower cooperating surface of the upper die 15. The fibres 11 of the preformed sheet realine themselves in the new position of the sheet on the corrugated surface of the screen so that said fibres follow and are parallel to this surface at each point. The surfaces 13, 14 are accurately shaped to press the preformed material between them to compact it in variable manner producing higher concentration and greater density in the inclined portions 16 between the crests 17.

As the dies 12, 15 approach each other the upper die surface 14 first contacts with the intermediate inclined portions 16 of the sheet, and as these are pressed the area of contact extends in each direction, and finally closes over at the apexes of the crests 17. The sheet originally being formed wide enough to follow the curving contour of the dies without any substantial amount of stretching, the dimension of the sheet will be exactly equal to the dimensions of the die and virtually no expansion takes place in pressing due to the ease with which the water passes out through the filter screen 12 and the heavier supporting corrugating filter screen 4 which is placed over the bottom die 5, which in turn is slotted as indicated at 8 for the drainage away of water removed by the pressing action. For a corrugated sheet 39⅞" wide the original sheet will be manufactured about 47⅝" wide, the final corrugations having a pitch of about 5½".

Fig. 3 shows the final sectional shape of the sheathing with the inner surface or valley 20 and the outer surface 21 of each crest 17 formed on equal radii R_1, R_2 around centers 22, 23 spaced apart a distance d equal to the final maximum thickness of the crest portion 17. The radii R_1, R_2 are preferably less than one half the pitch of the corrugations, i. e., less than one half the distance of one crest to the next crest on the same side of the sheathing, and also less than the height h of the crest on one side above the adjacent valley on the same side.

The original thickness t of the sheet 10 is only slightly greater than the maximum crest thickness d of the final sheathing, for instance, the original thickness may be approximately $\frac{5}{16}$", and this at the crest is compressed to $\frac{9}{32}$" in the final product. The vertical distance s at right angles to a plane tangent to the crests is constant at all points of the corrugated sheathing and is equal to the maximum thickness d. Between the crests the thickness measured normal to the surface at each point regularly decreases to substantially constant thickness between the plane surfaces of the straight connecting portion 16 where the thickness is reduced to approximately 13/64" with corresponding increase in the density of the material. Each crest 17 has its minimum density at the center and increases gradually in density towards the connecting portion 16.

The original sheet 10 (Fig. 1) is preferably formed of a composition of asbestos fibre and Portland cement, and may, for instance, consist of 25% of asbestos fibre and 75% of Portland cement. A filler may be used if desired in addition to the asbestos fibre and cement. In the Hatschek process the sheet 10 will normally contain an excess of moisture and will be sufficiently uncompacted to readily permit of reduction to the final shape (Fig. 3) by pressure between the impervious upper die surface 14 and the filter screen 12, and similarly any other method of

forming the sheet 10 should supply the sheet in sufficiently plastic and uncompacted form to permit the sheet to be readily preformed over the filter screen 12 without substantial disturbance of the continuity of the composition and then to insure accurate final shaping of the sheet between filter screen 12 and the die surface 14.

The product of this invention is very deeply corrugated in proportion to the thickness of the material in its finally compressed form (Fig. 3). For instance, for an overall height or depth for corrugation of 2" or more, the maximum thickness of the material may be about $\frac{3}{32}$" or $\frac{5}{16}$", so that the depth of corrugation will be four to eight times the maximum thickness of the material, and even greater proportionate depth of corrugation is permissible. The forming and pressing by the process of this invention leaves no weakness at the ridges or crests and the preforming of the sheet permits the composition to be very accurately controlled as to every part of the sheet, and with the fibres alined parallel to the surface at each point and following the curvature of the sheathing in its final form.

The accurate fitting of the upper and lower die surfaces produces accurate fitting surfaces on the sheathing so that the sheathing strips will closely contact at the area of overlap to form a weatherproof joint. The formation of the sheathing with the curved crest portions and the intermediate straight connecting portions permits the dies to first grip the intermediate portions and hold them against shifting during the pressing of the remainder. At the same time the separation of the crest by the intermediate portion avoids extreme steepness of transition from crest to crest which would tend to cause sliding and cleavage of the plastic material under the action of the die pressing. This moderate inclination of the connecting portions 16 also avoids any extreme thinning of the material at its intermediate portions and permits the full quota of material to be included by compression and compacting. Consequently, substantially the same amount of material is included at each portion of the sheathing and the thinness of the intermediate portions is offset by increased compactness and strength.

In the sheathing of this invention there is substantially the same amount of material in each transverse unit. It is compressed to different degrees so that where the sheathing is thinnest the material is most dense, and where it is thickest the material is less dense. Consequently the greater density at the thinner portions tends to compensate for any loss of strength. The great depth of the corrugation attains greater strength for the same weight of material, and also improves the appearance of the sheathing. By preforming the sheet for the sheathing the thickness can be accurately controlled and the fibres maintained relative to the sheathing surfaces at each point, and without any irregularities developing weakness at any point.

I claim:

1. A sheathing of rigid asbestos cement composition comprising a corrugated sheet having curved crest portions of variable density increasing in each direction from the center of the crest, and intermediate portions connecting said crests and of greater average density than the average density of said crests.

2. A sheathing of rigid asbestos cement composition comprising a corrugated sheet having curved crest portions and intermediate relatively thinner inclined portions connecting said crests, the depth of corrugation from the top of one crest and the lowest point of the next succeeding valley between the crests being at least four times the maximum thickness of the sheathing material measured normal to the surface at any point and opposite faces of said sheathing being substantially identical in contour.

3. A sheathing of rigid asbestos cement composition comprising a corrugated sheet having curved crest portions of variable density increasing in each direction from the center of the crest, and intermediate portions connecting said crests and of greater average density than the average density of said crests, the height of corrugation from the top of one crest to the lowermost point of the next succeeding valley being at least four times the maximum thickness of the sheathing at any point measured normal to the surfaces at that point.

4. A sheathing of rigid asbestos cement composition comprising a corrugated sheet having curved crest portions, and intermediate portions connecting said crests, each transverse unit of each of said portions containing substantially the same amount of material but varying in density from one portion to another, the opposite faces of said sheathing being substantially identical in contour.

5. The method of forming asbestos cement sheathing comprising mixing asbestos fibres and cement with water and working the mixture into substantially flat sheet form with the fibres extending parallel to the plane of the sheet, immediately preforming said sheet while plastic over a corrugated filter screen and with fibres extending parallel to the surface of the screen at each point thereof, pressing said sheet between dies permitting the excess liquid to drain away and acting to compact the material to greater density between the bends of the corrugations, and then allowing said pressed sheet to set permanently in corrugated form and with the opposite faces substantially identical in contour.

JOHN W. LEDEBOER.