Oct. 22, 1929. L. LANE 1,732,368

CORRUGATED ROOFING AND BUILDING SHEET

Filed Aug. 10, 1927

Fig. 1,

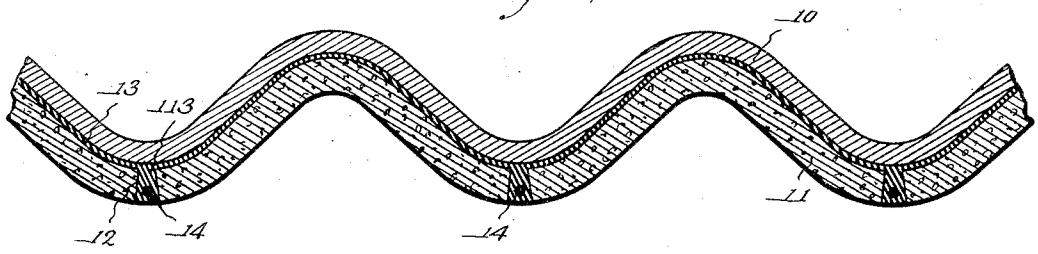


Fig. 2,

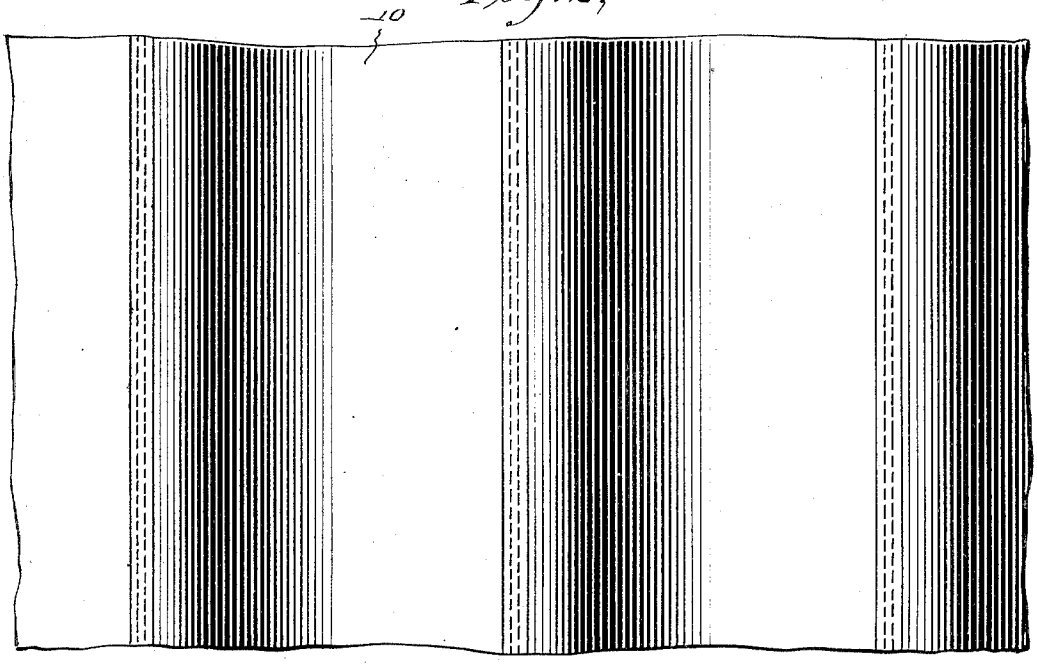


Fig. 3,

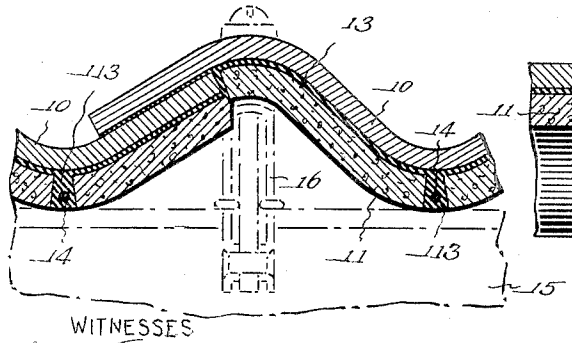
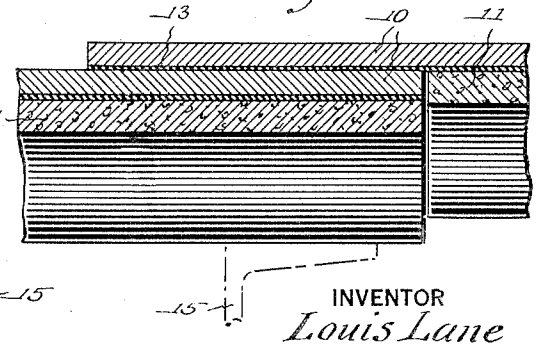


Fig. 4.



WITNESSES

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UNITED STATES PATENT OFFICE

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CORRUGATED ROOFING AND BUILDING SHEET

Application filed August 10, 1927. Serial No. 211,991.

My invention relates to an improvement in the construction of corrugated asbestos-cement sheets for use in buildings. Such corrugated asbestos-cement roof and siding sheets are commonly made out of various mixtures of more or less fibrous asbestos ingredients combined with Portland cement by a pulping process resulting as at present produced in a sheet of an integral single thickness or unitary sheet which on account of the materials used are commonly called corrugated asbestos-cement sheets.

Such sheets of asbestos combined with Portland cementing material are widely used for roofing and siding and other building purposes, especially in the tropics, in place of metal sheets on account of their higher thermal insulating quality as compared to metal.

In their better forms they are usually manufactured with a laminated texture, but however made, such unitary sheets are characterized by certain common defects that have rendered their use somewhat limited and often unsatisfactory. One of these defects is their brittleness and lack of elasticity and transverse strength so that they are somewhat easily broken; another is their irregular permeability to water absorption and a third is that they have entirely insufficient resistance to thermal transmission. Some years of use have fully demonstrated that especially in sun hot, humid and cold damp climates the sheets are unsatisfactory owing to their simple single thickness of the material of which they are made. In hot, humid countries they do not sufficiently insulate the building against the excessive sun heat outside and they permit humidity to pass through them because of their water absorption properties; and in cold climates they do not sufficiently retain the internal warming heat within the building, while in such cold climates when damp there is entirely too much condensation upon the sheets from their too rapid heat transmission or chilling.

The general object of my invention is to overcome these said defects to as great an extent as can be economically done so that the use of such corrugated asbestos-cement sheets may be extended to many purposes to which as now commonly made in their single thickness form they are not suited and that they may better fill their desired purposes where they are now being used.

Reference is to be had to the accompanying drawing forming a part of this specification, it being understood that the drawing is merely illustrative of one example of the invention.

Figure 1 is a cross section of a corrugated sheet unit embodying my invention.

Figure 2 is an inverted plan view of the sheet.

Figure 3 is a section of the side lap joints of associated sheets when emplaced.

Figure 4 is a section through the end overlaps, a portion of a supporting purlin being indicated in broken lines.

To secure the objects of my invention I provide and attach to the inside corrugated surface of each single thickness corrugated asbestos-cement sheet 10 an insulating lining sheet material 11 made up of a series of preformed strips or sections preferably one corrugation wide and mating the corrugated asbestos sheet used. I employ for my lining sheet elements preferably a pure cork-board or other vegetable base insulating material. I prefer to use that form of corrugated asbestos-cement sheets which need a part only of one corrugation when laid for the side lap joint. The lining sections I employ are first formed or molded to required shape before attachment to fit the corrugations of the asbestos-cement sheets to which they are secured. When made in my preferred form the strips I use have a width a little less than the center line base width of the inverted bottom crown of the corrugation of the outer sheet so that between the edges of two adjoining lining strips there is thus produced in between their opposed edges a narrow continuous radially wedge-shaped joint space 12. The formed corrugated strips may be made of such suitable lengths as is best for the material employed and applied with or without butting end joints as the case may be. Between the inner mating curved surfaces of the corrugations of the asbestos-cement sheets

and the outer curved surface of the formed corrugation lining strips I employ a suitable cementing medium 13 to attach the said series of preformed strips to the outer sheet in a secure waterproof manner, the same cement likewise, as at 113, filling all the joints 12 between the strips series including the radial wedge-shaped continuous base joints. Into the body of the cement filling at 113 of this continuous basal joint I insert a suitable metal tension element 14 of wire-like form and of continuous full length of the joint. This wire 14 embedded within the cement filling of the joint provides by the bonding strength of the cement a reinforcement of great value to the transverse carrying strength of my improved insulated sheet and at the same time serves to avoid all danger of breaking or cracking of the joint itself by reason of its reinforcement in the usual way. Where the insulating sheet lining material used is of cork I prefer to use some rapid setting and hardening Portland cement for the joining purposes; and where the sheet insulating lining material employed is of a pulp or woody character and the like, I prefer to use a properly proportioned magnesium oxy-chloride-silex-sand cementing mixture on account of its better bonding strength with such woody pulp material, although I do not limit myself to just such cementing materials alone.

I prefer to attach my improved duplex corrugated building sheet to the supporting purlins where they are of metal with attachments of a form having their point of support close to the inside crown of the corrugation. It will be noted that the radial wedge-like basal joint filling of reinforced cement material affords a solid bearing for my improved sheet directly upon the supporting member of much greater supporting value than if such bearings were of the softer material of the cork or other insulating lining material, so that my improved sheets have as firm a support as the original sheet element used therein.

The joint between the adjacent sides of my preferred form of sheets is formed by stopping the inner insulation material 11 of one sheet short of the edge of its overlying asbestos cement sheet so that, when the projecting portion of the latter sheet thereby formed overlies the edge of the adjacent sheet, the inner insulation sheets are in squeezing contact with each other.

This side lap joint, as shown in Figure 3, between the insulated lining portion edges is suitaby pointed up with elastic sealing cement 113 in between them and the overlap of the corrugated asbestos-cement sheets 10. As the attachment means clamping together the edges of the meeting sheets 10 are inserted through the next adjacent corrugations on each side of the overlap, neither sheet is lifted from its bearing on the purlin 15 and my improvement of this joint feature makes possible the stated squeezed contact sealing of the inner sheet lining below the outer overlap, as a means of adding greatly to the weather-tightness and security of the whole joint construction so that no leakage of air or heat in or out can occur at this joint, which leakage is a serious defect common to all corrugated asbestos-cement sheets now in use.

When my improved form of sheet 10 is for lowermost use in a wall or roof the united insulating lining is extended to the bottom edge of the sheet, except where this is not desired at an eaves location outside the wall line. When a sheet 10 is to be used above another sheet and overlaps it at the bottom end the united insulation lining is stopped up from the bottom edge of the sheet a distance equal to the width of the overlap, thereby permitting the direct contact together of the two corrugated asbestos-cement sheet faces at this overlap joint. In all cases the united insulating lining is extended to the top edge of the sheet 10 so that whether the sheets span one or more purlin spaces the insulating lining 11 of my improved sheet is continuous in between the tops of all supports 15 or equivalent supporting means, and the outer corrugated asbestos-cement element 13 of my duplex sheet, as shown in Figure 4.

As usually made corrugated asbestos-cement sheets are relatively thin and I prefer to use for the thicknesses of my preformed insulation lining elements 11 a thickness at least practically double that of the lined sheet 10 in order to secure such adequate thermal protection as is commonly needed, but it is apparent that a thicker or thinner lining element may be used. It is of easy calculation from the known thermal transmission qualities of the materials I employ in my improved duplex corrugated sheet that when pure corkboard is used as the thermal insulating element that the combined value of thermal resistivity of my improved sheet is at least fifteen times that of the simple single thickness corrugated asbestos-cement sheet by itself. Not only is the excessive sun heat thus stopped from entering the building, but all humidity inside as now resulting from constant rains outside permeating the asbestos-cement sheets to the inside is completely stopped by my united insulating lining, while all internal condensation now of common occurrence underneath the naked corrugated asbestos-cement sheets is completely eliminated because the united inner insulated surface of my improved sheets is kept at or near the room temperature regardless of the humidity within and the colder air without, affording thus with their added strength, a satisfactory and economical roofing and siding sheet for the uses stated. It will be apparent that any desired additional insulation or surface finish needed may be applied to the inner surface

of my impoved sheet in between the supports as required.

It may be pointed out that the radial or wedge shape of the cement joint filling 113 forms an effective holding clinch for the opposed edges of the insulating strips 11. Also the arrangement affords a solid seating element for the sheets upon their supports, as will be clear from Figure 3, in a manner superior to that of the soft edges of the insulating material 11 alone.

The broken lines indicated at 16 designate a clip or fastening means which forms no part of the present invention but forms part of the subject matter of another application filed by me and pending concurrently herewith.

I would state furthermore that while the illustrated example constitutes a practical embodiment of my invention, I do not limit myself strictly to the exact details herein illustrated, since, manifestly, the same can be considerably varied without departure from the spirit of the invention as defined in the appended claims.

I claim:

1. An improved article of manufacture, comprising a duplex corrugated building or roof sheet formed by uniting two separate, preformed corrugated sheet elements, the outer one being made of asbestos cement and the inner one from an assembly of pure molded and compressed compound cork-board sections, the said two united corrugated sheet elements being cemented together by joining cement between their meeting faces.

2. An improved article of manufacture, comprising a duplex corrugated building or roof sheet formed by uniting two separate, preformed corrugated sheet elements, the outer one being made of asbestos cement and the inner one from an assembly of pure molded and compressed compound cork-board sections, the said two united corrugated sheet elements being cemented together by a quick hardening aluminous Portland cement joining between their meeting faces.

3. An improved article of manufacture, comprising a duplex corrugated building or roof sheet formed by uniting two separate, preformed corrugated sheet elements, the outer one being made of asbestos cement and the inner one consisting of a board made of insulating material, together with a cementing, uniting medium between said sheet elements.

4. An improved article of manufacture, comprising a duplex corrugated building or roof sheet formed by uniting two separate, preformed corrugated sheet elements, the outer one being made of asbestos cement and the inner one consisting of a board made of insulating material, together with a cementing, uniting medium between said sheet elements, said cementing uniting medium consisting of a quick hardening aluminous Portland cement joining between their meeting places.

5. An improved article of manufacture, comprising a duplex corrugated building or roof sheet formed by uniting two separate, preformed corrugated sheet elements, the outer one being made of asbestos cement and the inner preformed corrugated sheet assembly consisting of a series of molded strips conforming to the corrugations of the outer sheet, said individual corrugated inner sheets having a basal pitch or width slightly less than that of the outer sheet to which they unite, thus forming continuous wedge-shaped joint spaces between the faces of the abutting strips, said joint spaces being filled with a cement filling.

6. An improved article of manufacture, comprising a duplex corrugated building or roof sheet formed by uniting two separate, preformed corrugated sheet elements, the outer one being made of asbestos cement and the inner preformed corrugated sheet assembly consisting of a series of molded strips conforming to the corrugations of the outer sheet, said individual corrugated inner sheets having a basal pitch or width slightly less than that of the outer sheet to which they unite, thus forming continuous wedge-shaped joint spaces between the faces of the abutting strips, said joint spaces being filled with a cement filling, and having embedded therein a continuous metal reinforcement member.

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