Nov. 23, 1943. E. R. HARRAP 2,335,208

REINFORCED ASBESTOS-CEMENT SHEET

Filed April 22, 1941

Fig. 1

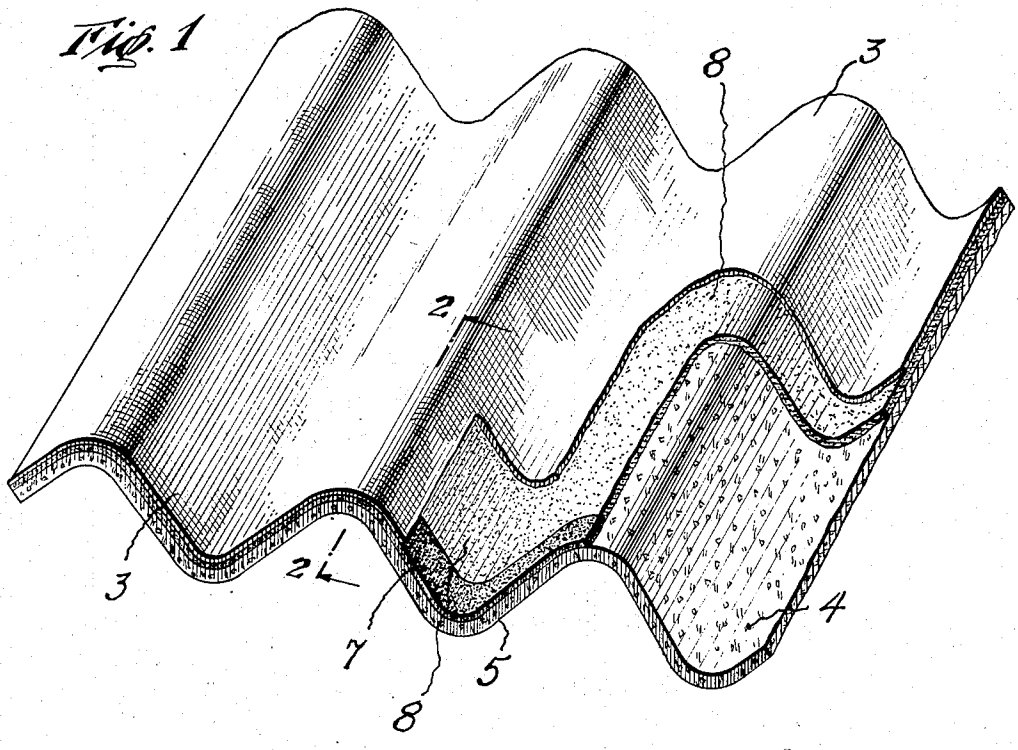
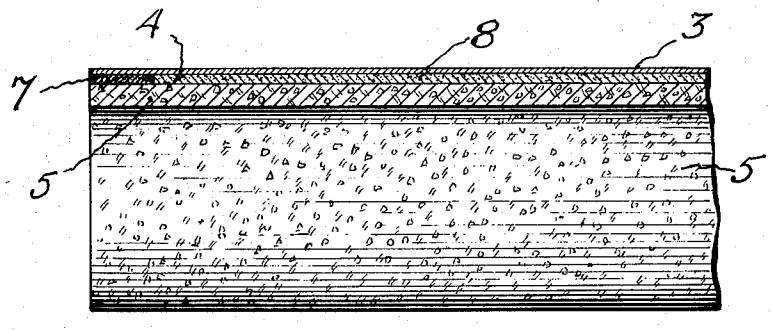


Fig. 2



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REINFORCED ASBESTOS-CEMENT SHEET

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In Great Britain May 7, 1940

3 Claims. (Cl. 154—45.9)

This invention is concerned with corrugated sheets made from fibrous materials and binding agents that set rigid from a plastic state, such as asbestos and cement. Asbestos-cement corrugated sheets are largely used as roofing materials. Asbestos-cement possesses excellent qualities for this purpose, as it is resistant to weather and corrosion and light in weight. However, it is relatively brittle and has not as much resistance to impact as is desirable. For this reason various proposals have been made to reinforce the sheets with metal inlays or to increase the depth of the corrugations, but none has led to wholly satisfactory results.

It is an object of this invention to improve the resistance to impact of an asbestos-cement or like sheet.

It is a further object of the invention to secure a reinforcing sheet to the underside of a corrugated asbestos-cement sheet in such a way as to give the composite sheet good resistance to impact.

In the accompanying drawings illustrating the invention,

Fig. 1 is a partial perspective view of a corrugated sheet with portions broken away to show the successive layers, and

Fig. 2 is a sectional view on the line 2—2 of Fig. 1.

I have found that the impact strength is increased by securing a sheet 3 of woven, knitted, matted or felted fiber to one side 4 of a corrugated asbestos-cement sheet 5 with a degree of adhesion such that upon an impact just enough to break the asbestos-cement or like sheet 5 the fiber sheet 3, at least over its middle portion, is able to pull away from, instead of breaking with, the asbestos-cement or like sheet. The composite sheet is used with the fiber sheet underneath the asbestos-cement sheet. By reason of the way in which substantially all asbestos-cement sheets are made, one side is smooth and the other is rough. When the sheets are placed in position in a roof the smooth side is exposed, so in normal sheets the fiber sheet is secured to the lower or rough side 4.

Unless the fibers are naturally resistant to rot and decay, as is the case with certain artificial fibers, the fiber sheet 3 should be treated in such a way that, while still remaining flexible, the fiber is prevented from rotting when exposed to normal atmospheric conditions, and preferably it is rubber-proofed. Other materials with which the fiber sheet material may be treated for this purpose are bitumen, cellulose derivatives, balata, gutta-percha, such artificial resins as polyvinyl chloride and polyvinyl acetate, and synthetic rubber such as that sold under the trade name "neoprene." If the fiber sheet is made of cotton, cuprammonium may be used.

It is preferred to use a sheet 3 of textile material, which may advantageously be hessian, as this is cheap and strong, but other materials such, for example, as hemp, flax, cotton duck, artificial silk, coconut fiber matting and so forth may be used. In any event, the sheet, whether woven or not, should have sufficient tensile strength to support the weight of an average man.

The fiber sheet 3 may be secured in any way, preferably by an adhesive 7, 8; when, as is preferred, rubber is used for proofing, a rubber solution may be used as the adhesive, or the proofed sheet may be secured in position by a rubber solution before vulcanization and then the whole assembly may be vulcanised. When rubber is used, it is not always necessary to vulcanise it, as uncured rubber containing a little copper or manganese in compound form oxidises and becomes tacky. Moreover, any copper salts present are a valuable protection against rot and decay in vegetable or organic fiber.

One example of a suitable adhesive is:

	Parts
Rubber latex (35% rubber)	250
Sodium silicate, 140° T	60
Water	460
Sulphur	2.5
Phenyl B naphthylamine	1
Zinc isopropyl xanthate	1

When this has dried a further coating of the same solution may be applied by a brush to the edges to give greater adhesion for transport purposes.

The adhesion of the fiber sheet to the asbestos-cement need not be very great, and in fact it is preferable for it to be so low that on an impact sufficient to fracture the asbestos-cement the fiber sheet will pull away from the asbestos-cement. On the other hand, there must be sufficient adhesion for the product to be handled without damage in trnasport, and it is therefore preferred to make the degree of adhesion vary over the sheet. At the edges 7 the fiber sheet should be firmly adherent to the asbestos-cement over a distance of, say 3 to 12 inches, and in the areas 8 within this firmly adherent border 7 the degree of adhesion should be low. In the drawing the thickness of the adhesive is greatly exaggerated, it being only necessary to use such film

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of the adhesive as will coat the surfaces to be joined and bind them together as described.

In securing the fiber sheet 3 to corrugated sheets 5, I may proceed as follows: The first step is to form rolls of rubber-proofed sheet with a tacky surface (interleaving liners being used to prevent the surface of one layer sticking to the back of the next) and to carry corrugated sheets on a conveyor under the rolled material. This is then unrolled directly into contact with the corrugated sheets, and cut into suitable lengths as required. The fiber sheet may be pressed into the corrugations by hand or by a fluted roller. Another way of securing the fiber sheet to the corrugated sheet is to place the fiber sheet on a template on which a flat unset asbestos-cement sheet is then placed, and the two are corrugated together.

It is found that the resistance to impact is very much increased by means of the invention and that although the heavy impact caused by a man jumping onto the sheet may break the asbestos-cement sheet the fiber sheet will prevent the man from falling through the broken sheet, and in fact will support his weight.

Finally, although for ease of description reference has been made throughout to asbestos-cement, the corrugated sheet to which the fiber sheet is secured may be made of any material suitable for roofing and consisting of fibrous material and a hydraulic binding agent that sets rigid from a plastic state.

I claim:

1. A building unit for roofing, siding and the like comprising a corrugated rigid base layer having alternate ridges and hollows, an underlying attached flexible fabric sheet conforming to the corrugated layer, the sheet being capable of maintaining its integrity upon impact by a fracturing force against the base layer so as to prevent disintegration of the unit and an intermediate adhering layer retaining the base layer and fabric sheet as a unit with such a degree of adhesion as to allow the fabric sheet to become separated from the base layer at the point of impact by an object capable of penetrating the base layer, whereupon the fabric sheet will restrain passage of the object through the unit due to maintenance of its integrity.

2. A building unit according to claim 1 in which the fabric sheet is rubber-proofed.

3. A building unit as set forth in claim 1 in which the intermediate layer between the basic layer and the fabric sheet has greater adhesion around the border of the unit than within this more firmly adherent border.

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