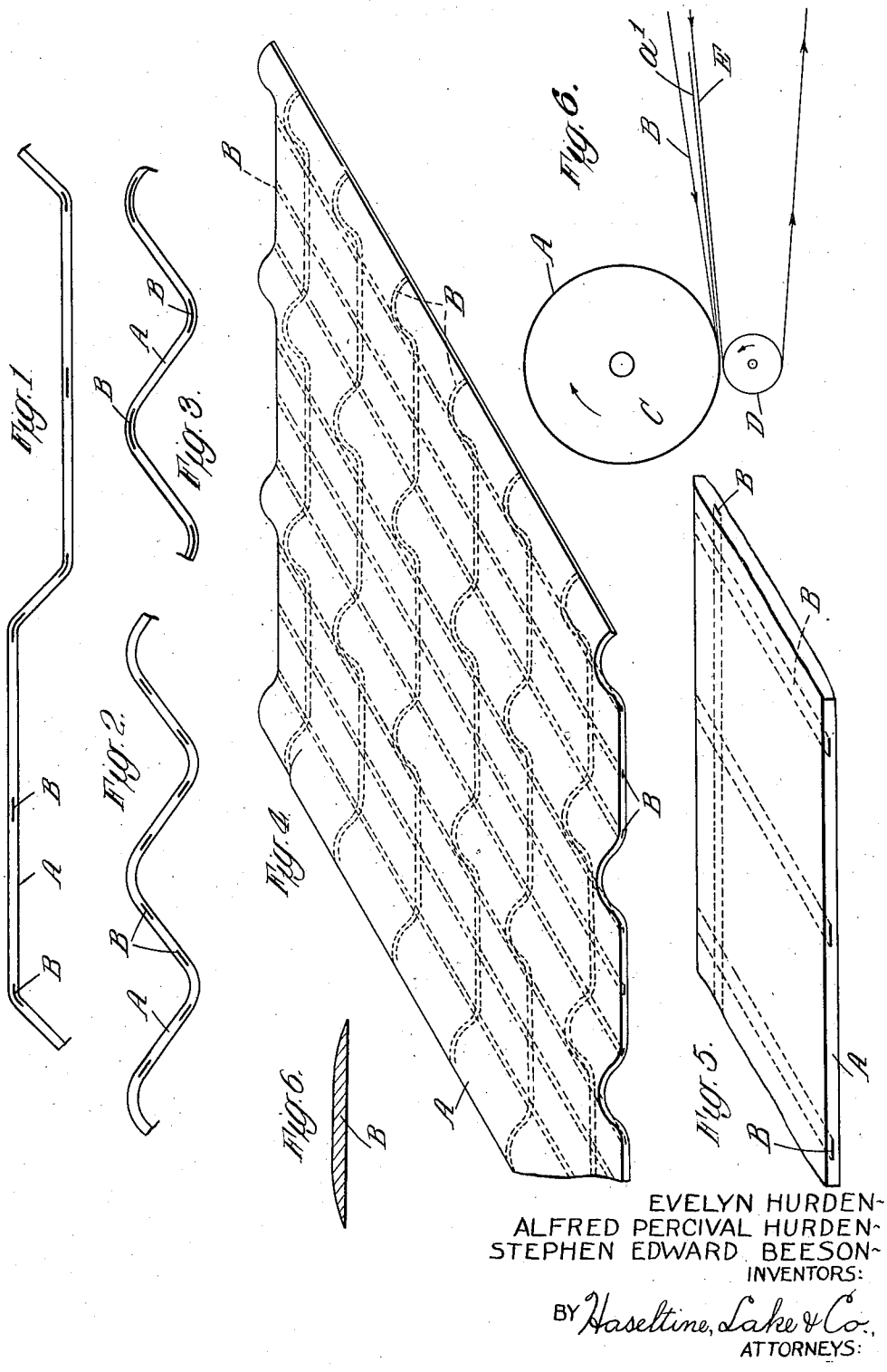
Oct. 24, 1933. E. HURDEN ET AL 1,931,494

REENFORCED ASBESTOS CEMENT SHEET

Filed Nov. 20, 1931



EVELYN HURDEN
ALFRED PERCIVAL HURDEN
STEPHEN EDWARD BEESON
INVENTORS:

BY Haseltine, Lake & Co.
ATTORNEYS:

Published by AsbestosClaims.Law
asbestosclaims.law/library/23542/1

Patented Oct. 24, 1933 1,931,494

UNITED STATES PATENT OFFICE

1,931,494

REENFORCED ASBESTOS CEMENT SHEET

Evelyn Hurden, Harefield, and Alfred Percival Hurden, Northwood, and Stephen Edward Beeson, Rickmansworth, England

Application November 20, 1931, Serial No. 576,286, and in Great Britain December 5, 1930

6 Claims. (Cl. 154—45.9)

The subject of this invention is a method of reenforcing asbestos cement goods of the kind composed of a mixture of Portland or other cement with asbestos fibre made up of a number of thin layers or laminations into sheets of the required thickness on a machine, as distinguished from goods originally made up from material in plastic state, poured into shape or otherwise cast or moulded. These sheets made up of laminated asbestos cement are then known as wall board if used in a flat condition, but may be shaped or moulded while wet from the machine to various shapes, for example roofing tiles and corrugated sheets.

It is well known to insert wire or asbestos braid reeinforcements into sheets of material made by casting or pouring in one operation or by ramming into a mould, and it has been proposed to insert expanded metal already shaped to the required form into cast concrete material, to insert flat strips of metal into boards made of wood pulp before consolidation, and to draw lengths of wire or woven wire webbing into slab moulded in one thickness in a machine; but the present invention does not relate to these matters, but to asbestos cement goods built up in layers as aforesaid.

Various attempts have been made to reenforce asbestos cement materials with ordinary wire, or wire-netting, chiefly by pressing between two wet sheets or by feeding the reenforcing material into the asbestos cement material while it is being made on the machine, the reenforcing material being inserted indiscriminately all over the sheet; but the results have not been found satisfactory owing partly to the excessive cost, partly to the fact that adhesion between the laminations or sheets is destroyed by the insertion of any continuous or substantially continuous sheet of material for reenforcement, and partly to the fact that the reenforcing material was not sufficiently flexible. It is also found that any round or square wire of sufficient strength, or similar reenforcing material of more or less round or square section, cuts into the asbestos cement material, thus weakening it and causing cracking. It has also been found impracticable to feed wire-netting on to the making roll, as it is not sufficiently flexible and destroys the film, and is also liable to damage the machine, and furthermore is liable to cause separation of the layers of sheeting

According to the invention, a reenforcement is incorporated in the material in the form of very thin and relatively narrow bands, ribbons or strips of flexible material placed in the positions in which tensile strength is requisite.

It is preferred to incorporate the reenforcement in the sheets while they are being built up on the machine, because if it is inserted between two thin sheets of the asbestos material and the sheets pressed together, the effects of the pressure render it difficult to mould the sheets into any other than a flat form.

The reenforcement must have the following characteristics:—

It must have high tensile strength.

The strips must not be so wide as to separate the layers of asbestos cement for too great a distance and thus to interfere with the adhesion of the said layers to each other.

It must have extreme flexibility in a longitudinal direction so that when fed on to the making roller of the machine it will not spring off, but lies in a curve corresponding with that of the making roller until the succeeding layer covers it; and it must also be flexible in a transverse direction so that when moulding, it does not distort or crack the sheet.

It must not be thick enough to distort the surface of the asbestos cement sheet, or to cause a longitudinal crack in the asbestos cement in the direction of its length, or to interfere with the building up of the asbestos cement sheet on the making roller.

It must not interfere with the subsequent moulding of the asbestos cement sheet into any shape required.

It must have sufficient adhesion to prevent it slipping when the asbestos sheet is placed under tension by a load in use.

It must not be subject to corrosion or other deterioration in use.

A narrow band of textile material, such as flax tape, or a mixture of high grade woven asbestos fibre with other textile fibre have been found to meet these requirements most nearly. The strips may be made of woven or plaited manilla, sisal, or any other fibrous material treated to make it rot-proof and twisted, woven or plaited into the desired shape and texture.

The strips may be notched, perforated, painted, or roughened in any convenient manner to ensure adhesion between them and the asbestos cement. The strips, or preferably the tapes are inserted in exactly the positions where extra tensile strength is expected to be needed when in use, running in any direction or directions that may be considered advisable, and they may have projections in any direction to give extra strength and pre-

Published by AsbestosClaims.Law
asbestosclaims.law/library/23542/2

vent cracking of the sheet; for instance, they may run longitudinally or transversely of the sheet, or both longitudinally and transversely, or diagonally or spirally, or other cross tapes may be used. They may be inserted at the edges of a semi-circular ridge, or adjacent to the upward bends of a ribbed tile, or at the bottom bands of a corrugated sheet, or at both the bottom and top of each corrugation, although they are more useful in the troughs or corrugations to resist tension than at the tops or crests of corrugations.

The reenforcement is to be used purely as a tensile reenforcement, that is, to resist tension under load, and is not intended as a beam or support to the tile or sheet, the latter itself being sufficiently strong in compression. The tensile reenforcement bands assume their correct position in the finished moulded article, that is, the flexible reenforcement is placed in a position to give maximum resistance to tension when the sheet is moulded into a series of corrugations or rises and depressions. The top portion of each corrugation or rise takes the compression load, and the bottom of the corrugation or channel takes the tensile strain, when a load is applied to the corrugated sheet or other article between spaced supports. As the material is strong in compression and relatively weak in tension, tensile reenforcement is necessary to balance the resistance and get maximum strength. The neutral axis lies approximately on a line taken through the centre of the corrugations. A flat sheet without mouldings or corrugations would not be reenforced to anything near the same extent as a corrugated one, as the reenforcement would be on the neutral axis. The main reenforcement is therefore placed in a position to take up the greatest tensile strain, although it may be advantageous to combine with this main reenforcement subsidiary cross reenforcements of much less strength to tie the sheet together and resist shear under load.

In order that the said invention may be clearly understood and readily carried into effect, the same will now be described more fully with reference to the accompanying drawing illustrating some exemplifications of the invention.

Figure 1 illustrates the application of the reenforcement to a walling sheet.

Figure 2 represents the edge of a corrugated sheet reenforced in the sloping parts.

Figure 3 represents the edge of a corrugated sheet reenforced at the tops and bottoms of the corrugations.

Figure 4 is a perspective view of a corrugated tile embodying the invention.

Figure 5 is a perspective view of the corner of a flat sheet embodying the invention.

Figure 6 is a diagrammatic elevation of apparatus in which the reenforcement is introduced in the manufacture of a sheet of asbestos cement.

In all the figures, A indicates generally the basic material used and B the reenforcing strips or tapes, which in all cases must be narrow and thin relatively to the dimensions of the sheet of the basic material, and spaced sufficiently wide apart to leave portions of the sheet between each strip of much greater area than the area occupied by the adjacent strips. In the examples according to Figures 4 and 5 the reenforcement takes the form of a very wide-meshed netting, and wire-netting would of course not be suitable.

The reenforcing strips or tapes may be placed in any position between two wet sheets of asbestos cement each constituted of a number of thin laminations and each of approximately half the requisite total thickness, before setting and pressing the sheets together, but they are preferably fed into the asbestos cement while it is being made up on the making roller, the strips being inserted when about half the requisite number of thin layers of the material have been built up, and the remaining layers being built up over the reenforcing strips. They can thus be inserted during manufacture without loss of time or stoppage of the machine. This preferred method of inserting the strips is illustrated in Figure 6, in which C indicates the making roller, D the felt roller or pressing roller, and E the travelling blanket of felt on which a film *a'* of asbestos cement is brought to the making roller to be wound thereon. The reenforcing strips or tapes can be laid over the film to be carried on to the making roller, or can be fed from a separate roller and reach the surface of the film *a'* at an angle as seen in the drawing. Many forms of mechanism could be used to carry out these operations, and it is not considered necessary to illustrate more particularly any examples of such mechanism, which does not constitute any part of this invention.

In cases where a corrugated or otherwise moulded sheet or tile rests on intermediate supports and is uniformly loaded, the parts between the supports are subject to tensile stress at the bottom of the sheet or tile, but at the parts thereof over the intermediate supports, tensile stress also exists at the top of the sheet or tile, so that in some cases it is desirable to reenforce it both at the top and bottom, as respresented in Figure 3. In other cases, as in that of the tile represented in Figure 4, the channels between the corrugations are provided with fairly closely spaced reenforcing strips, and continuous or other cross strips of wider spacing, which may also be of less strength individually, follow the curves of the corrugations.

What we claim and desire to secure by Letters Patent of the United States is:—

1. A sheet of asbestos cement material reenforced with a plurality of flat ribbons spaced apart and made of extremely flexible material of high tensile strength, such as flax tape, which ribbons are very thin and narrow relatively to the width of the sheet, and solely located in and restricted to those parts of the sheet which are intended to be subjected to tensile stress when in use.

2. A sheet of asbestos cement material consisting of a number of thin laminations of said material, between which laminations are enclosed a plurality of flat ribbons spaced apart and made of extremely flexible material of high tensile strength, such as flax tape, which ribbons are very thin and narrow relatively to the width of the sheet, and solely located in and restricted to those parts of the sheet which are intended to be subjected to tensile stress when in use.

3. A sheet of asbestos cement material consisting of a number of thin laminations of said material, between which laminations are enclosed a plurality of flat ribbons spaced apart and made of extremely flexible material of high tensile strength, such as flax tape, which ribbons cross each other approximately at right angles and are individually very thin and narrow relatively to the width of the sheet, and solely located in and restricted to those parts of the sheet which are intended to be subjected to tensile stress when in use.

4. A corrugated sheet of asbestos cement material consisting of a number of thin laminations

of said material between which laminations are enclosed a plurality of ribbons spaced apart and made of extremely flexible material of high tensile strength such as flax tape to reenforce the bottoms of the corrugations, which ribbons are very thin and narrow relatively to the width of the sheet.

5. A corrugated sheet of asbestos cement material consisting of a number of thin laminations of said material between which laminations are enclosed a plurality of ribbons spaced apart and made of extremely flexible material of high tensile strength such as flax tape to reenforce the tops and bottoms of the corrugations, which ribbons are very thin and narrow relatively to the width of the sheet.

6. A corrugated sheet of asbestos cement material consisting of a number of thin laminations of said material between which laminations are enclosed a plurality of ribbons spaced apart and made of extremely flexible material of high tensile strength such as flax tape to reenforce the bottoms of the corrugations, which ribbons are very thin and narrow relatively to the width of the sheet, and a plurality of similar ribbons of relatively less strength and more widely spaced apart which are similarly enclosed between the laminations transversely of said first named ribbons to follow the curves of the corrugations.

EVELYN HURDEN.
ALFRED PERCIVAL HURDEN.
STEPHEN EDWARD BEESON.