April 14, 1936. C. S. REEVE 2,037,268

ROOFING ELEMENT

Filed Jan. 3, 1931

Fig. 1,

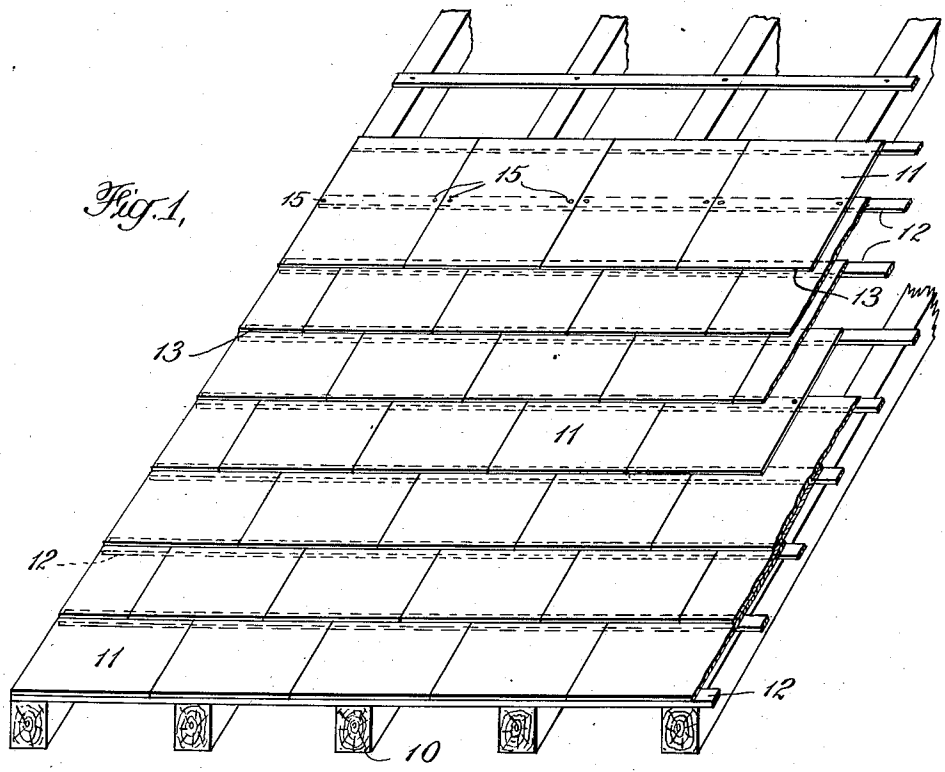


Fig. 2,

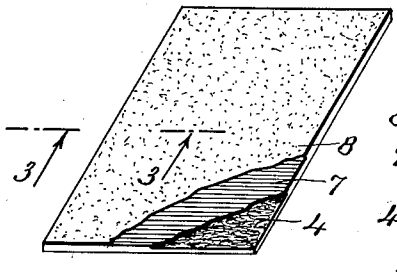
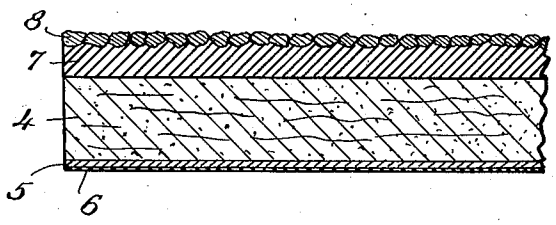


Fig. 3.



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ROOFING ELEMENT

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Application January 3, 1931, Serial No. 506,425

1 Claim. (Cl. 154—51)

This invention relates to rigid composition roofing elements and to a process for making such elements. More particularly, the invention relates to a rigid composition shingle which may be used in place of the wood, cement asbestos, or other rigid shingles and as distinguished from the flexible felt shingles now commonly employed in the formation of roofs.

One object of this invention is to provide a rigid waterproof roofing element that may be used in place of wood, cement asbestos, or other rigid shingles and may be laid on open decks in the same manner as wood shingles are applied thereto.

Another object of this invention is to provide a composition roofing element having as its base a relatively thick sheet or board composed of annual vegetable crop fibers alone or admixed with suitable fillers such as paper stock, rag stock, mineral fibers, etc., the sheet containing a major proportion of annual vegetable crop fibers or other coarse fibers so that it is porous and absorbent and therefore may be saturated and coated with bituminous material such as asphalt or pitch to form a comparatively light rigid roofing element.

A further object of the invention is to provide a process for the manufacture of rigid roofing elements having a relatively coarse absorbent base of fibrous material of sufficient thickness to be inherently rigid. Other objects and advantages of this invention will appear from the following detailed description.

Composition shingles having heretofore been made by forming a thin sheet of felt consisting largely of finely beaten rag stock in a paper-making machine, saturating the sheet by passage through a bath of asphalt, coating the saturated sheet with asphalt, surfacing the coated fabric with granular material and then cutting the surfaced sheet into shingles of the desired shape. Roofing felt and shingles produced in this manner, it will be noted, consist chiefly of a relatively thin flexible fibrous sheet which has no inherent rigidity and consequently if unsupported throughout substantially its entire surface area, will sag and disrupt the felt sheet. The heretofore known felt roofing has not been and cannot be laid on roof decks consisting of spaced laths in the manner that wood and other rigid shingles are applied for the reason that the felt shingles would sag between the points of support. This obviously would impair the weather and waterproof properties of the roof deck and would result in an unsightly roof covering. The well-known wood shingle has the serious objection that it is flammable. Cement asbestos shingles, tiles and other rigid shingles of this type are objectionable because of their increased weight as compared with wood and felt shingles, they require a stronger support and thus increase the cost of the roof covering. Further, cement shingles are relatively expensive to manufacture and therefore have been found useful in connection with relatively expensive dwellings only.

I have discovered that a comparatively inexpensive, light, rigid, fire-resistant shingle can be made from a fibrous base composed of coarse fibrous material such as annual vegetable crop fibers, for example, corn stalks, cotton stalks, straw, flax, bagasse, or sugar cane, alone or admixed with suitable fillers such as paper stock, rag stock, asbestos or other mineral fibers which may be incorporated with the coarse fibers to give desired characteristics to the sheet or board utilized in the formation of the base of the shingle. The base is preferably made on a paper or board machine in accordance with conventional paper or board making practice. Preferably, the base is made at least ⅛ of an inch thick. The fibrous base is then saturated with waterproofing material such as asphalt preferably under vacuum so that the air spaces and voids therein are substantially filled with bituminous material. A coating of waterproof bitumen may then be applied to one or both faces of the saturated board to form the shingle element. If desired, granular mineral material of one or more colors, such as colored slate, may be applied to and embedded into the coating. Before or after the surfacing with the granular material the coated sheet may be cut into individual or strip shingles simulating individual shingles of any shape or contour. A rigid waterproof and weatherproof comparatively light and inexpensive shingle element which is substantially fireproof is thus produced.

In the accompanying drawing forming a part of the specification,

Fig. 1 represents in perspective a portion of a roof covered with shingles embodying one form of this invention;

Fig. 2 shows in perspective a shingle with portions cut away to indicate the different layers constituting the shingle element; and

Fig. 3 is a fragmentary cross-section of the shingle on an enlarged scale taken along the line 3—3 of Fig. 2.

Referring to Figs. 2 and 3 of the drawing, the shingle has as its base a board or sheet 4 prepared

from any of the above mentioned fibers as hereinafter more fully pointed out. This base is saturated and preferably also coated with waterproof material such as asphalt or other bituminous materials. A thin coating 5 of bituminous material may be applied to the under side of the saturated fibrous board. Powdered mica, talc or other granular material 6 may then be dusted onto the coating 5 to provide the shingle element with a non-adhering rear surface. The face of the shingle may be coated with bituminous material 7 and surfaced with granular material 8 which may be of a single or variegated hue. The granular mineral particles may be applied to form desired design lines or configurations on the exposed face of the shingle. Instead of applying mineral material in the form of design configurations, designs may be painted on the granular facing or the facing may be eliminated and designs painted, embossed or otherwise formed on the bituminous coating. Further, in lieu of having the shingle of uniform thickness it may be tapered or otherwise shaped. The shingle after saturation and coating of the fibrous base preferably has a thickness of at least ⅛ of an inch and may have a thickness of $\frac{3}{16}$ of an inch or more.

One manner of laying the shingles on a roof deck is shown in Fig. 1. The individual shingles 11, which in the embodiment illustrated are approximately 9 inches wide and 16 inches long, are placed on the spaced supporting laths 12 which are carried by the supporting timber 10. The forward and rear edges of the shingles rest on the laths 12, the portion of the shingles between laths 12 being unsupported. The shingle elements are laid in courses with the lower edges of the shingles of one course overlapping the upper portions of the shingles of a lower course, permitting the exposure of a suitable portion of the shingle to the weather. Nails or other fasteners 15 pass through the covered portions of the shingles as shown and secure them to the laths 12, the overlapping shingles covering the nails or fasteners. The shingles maintain their shape by virtue of the inherent rigidity which they possess. As the edges 13 of the shingles are of an appreciable thickness and are several times the thickness of the edges of ordinary roofing felt shingles, they stand out in relief, imparting a pleasing ornamental appearance to the roof. Consequently, the shingles of this invention have greater architectural value than the usual felt shingle.

The base or board 4 in accordance with this invention is preferably made from annual vegetable crop fibers such as corn stalks, either raw or cooked, cotton stalks, sugar cane, flax, straw or bagasse alone or admixed with a minor proportion of suitable filler. I have discovered that a rigid relatively light shingle element may be produced by saturating a board or sheet made of suitable thickness from coarse fibers of the type above indicated with bituminous material.

Satisfactory bases may be produced by mixing straw fiber with paper stock in the proportion of 70% of the former to 30% of the latter, the percentages being based on the end product. The fibers in the proportions indicated are preferably beaten in hot water and may then be made into a board or relatively thick sheet on a conventional type board making machine.

I have obtained a base of relatively coarse, open and highly absorbent nature by mixing 70% corn stalk fibers with 30% paper stock, beating the fibers in cold water and then forming the board in the usual manner. A satisfactory base has also been obtained by mixing 75% cotton stalks with 25% paper stock and forming the resulting furnish into a board in accordance with well-known pulp and board making practice. The examples above given are illustrative of furnishes which have been found suitable for the manufacture of the fibrous board base of this invention. It will be understood that the invention comprehends as the base element a relatively coarse and highly absorbent fibrous board of sufficient thickness to be inherently rigid and which might be made by the skilled pulp engineer from annual vegetable crop or other coarse fibers alone or admixed with suitable fibers or inert fillers. If the furnish, which may consist of coarse fibers of only one type or a mixture of such fibers, or one or more coarse fibers admixed with suitable fiber or inert fillers, is such that too porous a base results, the porosity may be reduced by adding to the furnish paper or rag stock to lessen the voids or air spaces in the base.

Saturated fibrous bases formed in accordance with my invention have a rigidity number of at least approximately 30. The rigidity number is determined by ascertaining one one-hundredth of the weight necessary to produce a deflection of one inch in a test piece of material two inches wide and one-eighth inch thick, supported on its flat surface by parallel knife edges 12 inches apart, the weight being applied at the rate of 3200 grams per minute to the test piece substantially midway of the supports.

The rigidity numbers of exemplary fibrous board bases which I have found suitable for the manufacture of my improved shingle tested as above indicated are as follows:

Type of board	Thickness of board	Rigidity number
	Inches	
70% straw and 30% paper	.188	83
Ground wood pulp board, known commercially as Insulite (B)	.184	44
Compressed wood fibre (soft) board, known commercially as Masonite Soft (B)	.187	46
Compressed wood fibre (hard) board, known commercially as Masonite Hard (A)	.127	50
Bagasse (sugar cane) board, known commercially as Celotex (B)	.225	53
Compressed wood fibre (hard) board, known commercially as Masonite Hard (B)	.190	144

The above numbers compare with rigidity numbers 9 to 10 obtained by testing a prepared roofing shingle manufactured from a felt of maximum thickness now on the market.

The following is given as an illustrative embodiment of this invention:

A quantity of corn stalks is subjected in hot water to the action of a beating engine such as that commonly used in the paper industry. Beating is continued until the fibers are reduced to suitable size without reducing them to the fine state of subdivision required for paper or roofing felt. When the beating is completed, beaten paper stock is mixed with the corn-stalk fiber in the approximate proportion of 33 parts of the former to 67 parts of the latter. This mixture, after being well mixed, is passed over a board machine of conventional design to form a board of, preferably, at least ⅛ of an inch thickness but which may be from ⅛ to ¼ of an inch thickness. The boards are dried by subjecting them to a temperature of approximately 100° C. After being dried the boards are saturated by immer-

sion in hot liquid asphalt, preferably an asphalt of 140° F. to 170° F. softening point, under vacuum until at least 80% of the voids in the board are filled with the saturating medium.

The saturated board may be coated with bituminous material and if desired surfaced with granular material as indicated above. Before or after surfacing the saturated fibrous base may be cut into individual or strip shingles.

The shingle elements of the invention are relatively light, having a specific gravity of approximately 1.0. This compares with specific gravities of 2.5 and higher of cement shingles. In view of the lightness of the shingle, the roof deck need not be of the rugged type necessary for heavier shingles and consequently an economy in the roof structure is effected not only by the reduced cost of the shingle, but also by decreasing the cost of the necessary support therefor. Further, the shingle of this invention has a lower heat conductivity than cement tiles and consequently impedes the flow of heat from the interior of the house to the atmosphere and also prevents the flow of heat in reverse direction.

Since modifications in the details of the shingle or the carrying out of the process might be made by those skilled in the art without departing from the invention, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

I claim:

A rigid waterproofed roofing element having as its base a fibrous board composed of at least a major proportion of coarse absorbent fibrous material in which the fibers are materially coarser than the fibers constituting the usual flexible roofing felt consisting substantially entirely of finely beaten rag fibers, said base being substantially thicker than the thickness of the usual flexible roofing felt and the thickness of said base being such that it is inherently rigid, the coarse fibrous material causing the formation of larger voids in the base than in the usual roofing felt so that the said base can be readily waterproofed by impregnation with molten bituminous material and said base being impregnated with said bituminous material so that the voids between the fibers thereof are substantially completely filled with said bituminous material to render it substantially waterproof.

CHARLES S. REEVE.