

H. F. WEISS.
 COMPOSITE FIBROUS PRODUCT.
 APPLICATION FILED APR. 25, 1919.

1,387,219.

Patented Aug. 9, 1921.

Fig. 1.

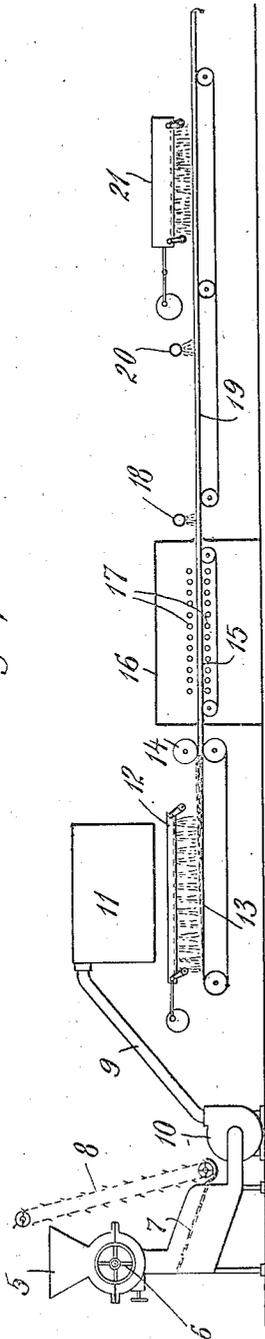


Fig. 2.

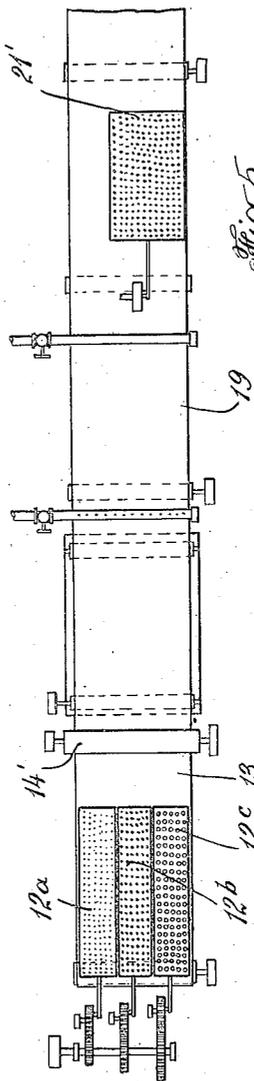


Fig. 3.

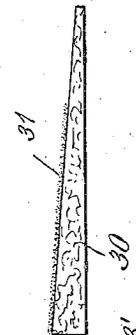


Fig. 4.

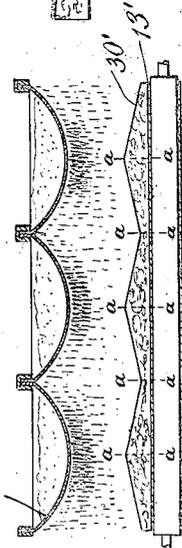
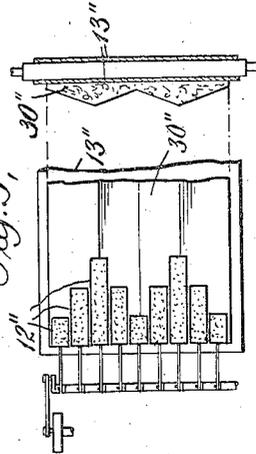


Fig. 5.



INVENTOR

Howard F. Weiss

BY

Rossie Davis Marvin & Edwards
 ATTORNEYS

UNITED STATES PATENT OFFICE.

HOWARD FREDERICK WEISS, OF MADISON, WISCONSIN, ASSIGNOR TO C. F. BURGESS LABORATORIES, OF MADISON, WISCONSIN, A CORPORATION OF WISCONSIN.

COMPOSITE FIBROUS PRODUCT.

1,387,219.

Specification of Letters Patent.

Patented Aug. 9, 1921.

Application filed April 25, 1919. Serial No. 292,677.

To all whom it may concern:

Be it known that I, HOWARD F. WEISS, residing at Madison, in the county of Dane, State of Wisconsin, have invented certain
5 new and useful Improvements in Composite Fibrous Products; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it ap-
10 pertains to make and use the same.

This invention relates to composite fibrous products, and has for its objects the provision of improved methods for making the same, as well as the provision of new
15 articles of manufacture resulting from the practice of the method of the invention. The present invention more particularly relates to composition roofing material, such, for example, as composition shingles and the
20 so-called "asphalt" shingles. In this connection, the invention contemplates the provision, as a new article of manufacture, of a new and improved composition roofing material, and more particularly a new and
25 improved composition shingle, as well as a new method of making the same.

The method in general practice at the present time of producing roofing felts and so-called asphalt shingles consists in first
30 beating rags into a pulp, and then forming the pulp into a felt in a paper machine. The felt thus formed is then dipped into a tank containing a hot saturating material, usually a coal tar, or asphalt, product. The
35 excess of the saturating material is removed by passing the saturated felt through squeeze rolls. In certain types of roofing, saturated felt is coated with a weather-resisting coating of either coal tar pitch, or
40 asphaltum, and on this is sprinkled a coating of powdered or crushed mineral matter. In the manufacture of shingles, this sheet of saturated and coated felt is passed through a cutting machine which cuts the shingles
45 to any desired form or shape.

There are several objects to this present method of manufacturing roofing material and shingles. Unless a very good grade of
50 rags is used and considerable care taken in beating them to form them into a felt, the felt will break when passing through the saturating machine, thus causing considerable delay and trouble. On the other hand, good

grades of rags are expensive and cannot be economically used for this purpose. Again, 55 in order to saturate the felt, it is necessary to use a saturant of low melting point. This, in turn, tends to soften the weathering layer deposited on the saturated felt, causing the roof surface to creep, especially when the
60 pitch of the roof is sharp. Shingles made in the manner described are of substantially the same thickness throughout, thus giving a rather flat and unartistic appearance to the roof. Furthermore, shingles made in
65 this manner have a tendency to curl and lift up in strong winds, thus causing the roof to leak, and this difficulty is especially true when the pitch of the roof is small.

The present invention contemplates a new 70 method of manufacture composition roofing material and shingles, in which the procedure is greatly simplified, and by which the cost of manufacture is materially lessened as compared with existing practice. In ac- 75 cordance with the method of the invention, a mixture of suitable fibrous material and a binding agent, preferably coal tar pitch or asphalt, while in a substantially dry and solid condition, is formed into the desired 80 shape by compression. The compressed mixture is then preferably warmed, and, while warm, is impregnated with a suitable saturant, such as coal tar pitch, or asphalt. The exposed surface of the thus saturated 85 and compressed material is then preferably coated with a film of pitch of higher melting point and then with crushed mineral material, and the product may then be cut into the desired shape and size. 90

In carrying out the invention, the fibrous material and binding agent, mixed in the proper proportion, and both being in a dry and solid condition, are introduced into a shredding machine. The shredder sepa- 95 rates the fiber in the fibrous material and pulverizes the binder, and at the same time produces an intimate mixture of both fiber and binder. When a brittle, non-fibrous, homogeneous mass like pitch is struck a 100 sharp blow, it is broken into a great number of fractures which produce extremely fine particles of the substance, and give what is called a powder. Under the same impact a fibrous material tears apart rather than 105 pulverizes because of its fibrous structure.

The binding material and fiber are put into a hopper either already mixed, or they can be fed separately by means of two conveyer belts. The shredding engine so disintegrates these as to produce a thorough mixture of fiber and binder. After the shredding and mixing operation, the mixture of fibrous material and binder is screened, in order to separate the particles which are still in too coarse a condition for the subsequent operations. The coarse particles may be returned to the shredder. The material passing through the screen is of proper size and is conveyed to a storage bin from which it passes through a vibrating screen and is deposited on a moving belt or other suitable receiver. When the mixture of shredded fiber and pulverized binder has been thus deposited to form a layer of the required thickness, it is compressed, preferably between squeeze rolls, at room temperature. When making sheet roofing material, the deposited layer of mixed fiber and binder may be of substantially uniform thickness, whereas when making shingles, I prefer to so control the deposition of the mixture as to make the compressed article thicker at one end than at the other. This treatment compresses the fiber and binder into a sheet or mat. This is then warmed to 200° F. or over, and while warm, a film of the saturant is deposited upon the upper surface of the mat. This film is quickly absorbed by the mat, which thus has all of its fibers coated by the saturant and all of its interstices are filled. The mat is then cooled slightly, after which it is coated with a second film, this being of higher melting point than the former and serving as a weathering layer. On this is sifted some powdered or crushed mineral matter to give a finishing surface. After sufficient cooling has occurred, the mat, saturated and coated in the manner described, is fed into a cutting machine which cuts it into pieces, for example shingles, of the desired size and shape.

In Figure 1 of the accompanying drawings there is diagrammatically illustrated an elevation of an apparatus for carrying out the method of the present invention; Fig. 2 is a plan view of a similar apparatus particularly adapted for the manufacture of shingles of tapered section; Fig. 3 is a sectional elevation of a shingle made in accordance with the invention; and Figs. 4 and 5 diagrammatically illustrate a modification of the apparatus.

The apparatus diagrammatically illustrated in Figs. 1 and 2 has a belt (13-15-19) of a width approximately equal to the length of a shingle, say, for example, about 13 inches. It is more economical to provide the apparatus with a belt several shingle lengths in width. This can be done by mul-

tiplying the width of the belt to several shingle lengths, and longitudinally cutting or slitting the finished product, as will be more fully explained in connection with Fig. 4 of the drawings.

Referring to Fig. 1 of the drawings, the fibrous material and binding agent, each in a substantially dry and solid condition, are fed into the hopper 5 of the shredder 6. From the shredder the mixed materials fall onto the screen 7, from whence the coarse particles are returned by a conveyer or elevator 8 to the hopper 5, while the mixture of finely divided binder and shredded fiber is blown through a conduit 9 by a fan 10 into a storage bin 11. From the storage bin the suitably proportioned mixture of fiber and binder is fed onto a vibrating screen 12, from whence it is deposited onto a belt or conveyer 13. When a layer of mixed fiber and binder of sufficient depth has been obtained, it is passed through the compression rolls 14 which squeeze it into a compact mass of mat-like form. The compact mass then passes onto a conveyer 15 and thence to a heating chamber 16 wherein a temperature of about 200° F. is maintained, as, for example, by means of heating pipes 17.

While still warm, and preferably while still heated to a temperature of 200° F. or over, a film of saturant is deposited upon the upper surface of the compact mass by means of a spray pipe or coating roll 18 or any equivalent applying means. By use of the term spraying I mean to include all such means. As the saturant I may use coal tar pitch, asphalt, or the like. The saturant may, of course, be hot, if desired, in order to increase its fluidity and its penetrating power. The thus saturated mat is cooled slightly while being carried along by a suitable belt or conveyer 19. A coating agent of substantially the same general character as the saturant, but preferably of a higher melting point, is then sprayed on the mat by means of a pipe 20 or spread by means of a coating roll. A surface layer of powdered or crushed mineral matter is then deposited on the mat by means of a vibrating screen 21 or other suitable device, whereupon the product is fed to an appropriate cutting machine.

I may use fibers of any suitable kind, preferably having absorptive properties, and I have secured good results from fibers of sulfite, sulfate and ground wood pulps, and papers and also from bark and moss. However it will, of course, be understood that the invention is not restricted to the specific kinds of fibers just mentioned, since numerous other fibrous materials may be used. The function of the fibers is to act as a reinforcement to the saturant. If properly coated with the saturant the fibers will resist decay over a long period of time.

In making shingles by the method of the invention, I prefer to use much less binder in the thin end of the shingle than in the thick end up to the time the mixture of fiber and binding agent is compressed. I have found that 20% binder to 80% fiber by weight is satisfactory for the thin end of the shingle, whereas for the thick end this proportion can be reversed. This treatment produces a shingle having a flexible thin end and a rigid butt end. Furthermore, in coating the surface of the shingle with mineral matter, I prefer to extend this coating only two-thirds of the length of the shingle from the butt end, since the upper one-third of the shingle is always covered by having shingles on top of it. Such treatment effects a saving in the weight of the shingle.

Shingles of tapered section, that is, thin on one end and thick on the other, can be produced by using screens of different degrees of fineness and different rates of vibration. Thus, in Fig. 2 of the drawings, I have represented three screens 12^a, 12^b and 12^c for depositing the mixed fibrous material and binder on the belt conveyer 13. The mesh of the screen 12^c is coarser than that of the screen 12^a, while the screen 12^b is of an intermediate mesh. Moreover, the screen 12^c is arranged to be vibrated more rapidly than the screen 12^b, the latter is arranged to be vibrated more rapidly than the screen 12^a. In this manner a deposit of unequal thickness is formed on the conveyer 13. By the arrangement shown in Fig. 2, the thickness of the deposit will increase from the top to the bottom of the conveyer 13. It will, of course, be understood that it is not necessary to use both screens of different degrees of fineness and different rates of vibration, since either expedient alone may be sufficient to produce the desired non-uniformity in the thickness of the deposit on the conveyer 13. It will furthermore be understood that the three separate screens 12^a, 12^b and 12^c may be combined in a single screen in which the mesh varies from one side to the other. The space between the cooperating surfaces of the compression rolls 14' is, of course, suitably adjusted to conform to the desired tapered section of the shingle. The screen 21' for depositing the crushed mineral matter on the saturated product is arranged to extend across about two-thirds of the width of the conveyer 19, so as to coat only about two-thirds the length of the shingles from the butt end, as illustrated in Fig. 2.

Instead of using three separate screens for giving a variation in thickness I have found that one screen can be used to produce the tapered shingle if the screen is not stretched horizontal and parallel to the surface of the belt on which the fibers and binder are deposited. Greatest deposition

of fiber and binder occurs when the surface of the screen is horizontal and least when it is vertical. By properly varying the pitch of the screen the desired variation in thickness of deposit can be secured. Thus, in Fig. 4 of the drawings, I have shown a screen 12' composed of a plurality of cylindrical sections of such configuration and design as to produce on the belt 13' a deposit of progressively varying depth, as illustrated by reference numeral 30'. The finished product will have substantially the same sectional configuration as the deposit 30', and is longitudinally cut or slit on the lines *a-a* to make shingles of the proper length. The apparatus represented in Fig. 4 is thus six shingles lengths in width. Various other arrangements may obviously be employed for producing the desired uneven deposition of the fibrous material and binder on the conveyer belt, and the particular arrangement represented in Fig. 4 is merely illustrative. Thus, in Fig. 5 of the drawings, an uneven deposit of the character indicated at the right end of the figure by reference numeral 30'' is produced on the belt 13'' by a plurality of screens 12'' of progressively varying lengths. These screens may be mechanically independent or may of course be combined in one unitary structure, and, in either case, are vibrated in any suitable manner.

A shingle of tapered section embodying the invention is illustrated in Fig. 3. This shingle is composed of a compact body of shredded fibers and pulverized binding agent impregnated with a suitable hydrocarbon saturant, such as coal tar pitch, asphalt, or the like. The exposed surface of the shingle has a coating of crushed fibrous material extending about two-thirds of its length from the butt end. The thinner end of the shingle contains 25% or less of a binder of relatively high melting point, while the thick end contains 50% or more of the binder.

While I have hereinbefore particularly described my invention in connection with the manufacture of composition roofing material, I wish it to be understood that in its broad aspect the invention is not limited thereto. Thus, for example, the steps of mixing the fibrous material and binding agent and heating a suitably shaped and compacted mass thereof is employed with advantage in the manufacture of wall board, as described in my copending application, Ser. No. 279,288, filed February 26, 1919. Other useful and advantageous applications of these generic features of the improved method of the present invention will occur to those skilled in the art. In the appended claims, I, therefore, aim to cover this broad aspect of the invention as well as the particular application of the invention to the

manufacture of composition roofing material.

What I claim is:

1. The method of manufacturing composition roofing material which comprises mixing in a substantially dry and solid condition fibrous material and a binding agent, subjecting said material to compression to shape the same, and spraying the compressed mixture with a saturant.

2. The method of manufacturing composition roofing material which comprises subjecting a mixture of fibrous material and a binding agent in a substantially dry and solid condition to a shredding operation, shaping the mixture, and impregnating the shaped mixture with a hydrocarbon saturant.

3. The method of manufacturing composition roofing material which comprises compacting while in a substantially dry and solid condition a mixture of fibrous material and a binding agent, heating the compact mixture, and spraying the compact mixture while still warm with a hydrocarbon saturant.

4. The method of manufacturing composition roofing material which comprises compacting while in a substantially dry and solid condition a mixture of fibrous material and a binding agent, spraying the compact mixture with a hydrocarbon saturant, and surfacing the article so formed with a layer of crushed mineral matter.

5. The method of manufacturing composition roofing material which comprises treating a mixture of fibrous material and binding agent to shred the fibrous material and pulverize the binding agent, compacting the mixture to suitably shape the same, and saturating the compact product with a suitable saturant.

6. The method of manufacturing composition roofing material which comprises treating a mixture of fibrous material and binding agent to shred the fibrous material and pulverize the binding agent, compacting the mixture to suitably shape the same, heating the compact product, saturating the compact product while still warm with a hydrocarbon saturant, and coating a surface of the article so formed with crushed mineral matter.

7. The method of manufacturing composition roofing material which comprises subjecting a mixture of fibrous material and binding agent in a substantially dry and solid condition to a shredding operation, compacting the mixture into a mat of tapered section, and saturating the mat with a hydrocarbon saturant.

8. The method of manufacturing composition roofing material which comprises mixing fibrous material and a binding agent, passing said mixture through compression

rolls to compact the same, heating the compact product, and spraying a hydrocarbon saturant on the compact product while still warm.

9. As an article of manufacture, a composition shingle of tapering body section comprising a body of fibrous material and binding agent impregnated with a hydrocarbon saturant, the thinner end of said shingle being flexible while the thicker end is stiff and rigid.

10. As an article of manufacture, a composition shingle of tapering body section comprising a body of fibrous material and binding agent impregnated with a hydrocarbon saturant, the thinner end of said shingle containing a relatively greater proportion of fibrous material and a relatively smaller proportion of binding agent than the thicker end.

11. As an article of manufacture, a composition shingle of tapering body section comprising a body of fibrous material and binding agent impregnated with a hydrocarbon saturant, the thinner end of said shingle containing less than about 25% of binding agent while the thicker end contains more than about 50% of binding agent.

12. In a method of making a composition article containing fibrous material, mixing in a substantially dry and solid condition fibrous material with a binding agent, depositing a layer of the mixture on a movable conveyer, compacting the deposited layer of said mixture, heating the compact product and spraying said product with a hydrocarbon saturant.

13. In a method of making a composition article containing fibrous material, mixing in a substantially dry and solid condition fibrous material with a binding agent, compacting a suitably shaped mass of said mixture, heating the compact product and spraying said product with a hydrocarbon saturant.

14. In a method of making a composition article containing fibrous material, subjecting a mixture of fibrous material and a binding agent in a substantially dry and solid condition to a shredding operation, depositing a layer of the resulting mixture on a suitable support, compacting the deposited layer of said mixture, and heating the compact product.

15. The method of manufacturing composition roofing material which comprises treating a mixture of fibrous material and a binding agent to shred the fibrous material and pulverize the binding agent, compacting the mixture to suitably shape the same, heating the compact product, saturating the compact product while still warm with a hydrocarbon saturant, coating a surface of the article so formed with a weather resistant layer of hydrocarbon, and

deposing a layer of mineral matter on said weather resistant layer.

16. In a method of making composition shingles containing fibrous material, which comprises mixing in a substantially dry and solid condition, fibrous material with a binding agent, depositing a layer of the mixture on a movable conveyer, compacting the deposited layer of said mixture, heating the compact product, spraying said product with a hydrocarbon saturant, and cutting the sheet thus formed into the desired shapes.

17. A method of manufacturing composition roofing material, which comprises mixing, in a substantially dry and solid condition, fibrous material and a binding agent, depositing said mixture on a support to form a deposit of varying depth, and compacting and heating the deposit to form an article of tapered section.

18. A method of manufacturing composition shingles which comprises mixing, in a substantially dry and solid condition, fibrous material and a binding agent, depositing said mixture on a support in such a manner as to form a deposit of varying depth, compacting and heating the deposit to form an

article of tapered section, and cutting the article thus formed into the desired shapes. 30

19. A method of manufacturing composition roofing material which comprises making a plurality of differently proportioned mixtures of fibrous material and a binding agent, depositing said mixture on a support in such a manner that the proportion of one ingredient progressively increases from one side to the other of the deposit, while that of the other ingredient correspondingly decreases, and compacting and heating the deposit. 35 40

20. A method of manufacturing composition roofing material which comprises making a plurality of differently proportioned mixtures of fibrous material and a binding agent, depositing said mixtures on a support in such a manner that the proportion of one ingredient progressively increases from one side to the other of the deposit, while that of the other ingredient correspondingly decreases, the deposit being of varying thickness, and compacting and heating the deposit to form an article of tapered section. 45 50

In testimony whereof I affix my signature. 55
HOWARD FREDERICK WEISS.