H. MacINNES.

ART OF PRODUCING FLEXIBLE SHINGLES.

APPLICATION FILED MAY 6, 1921.

1,431,476. Patented Oct. 10, 1922.

Fig. 1.

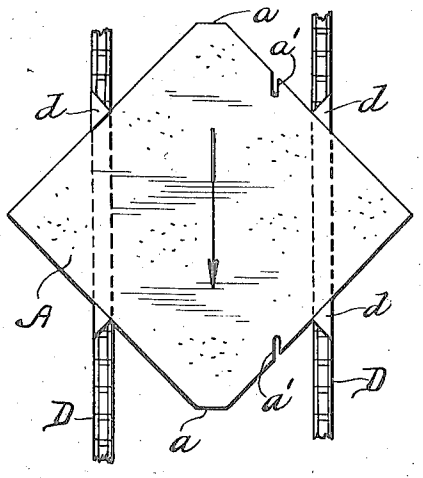


Fig. 3.

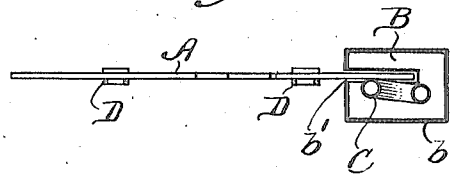
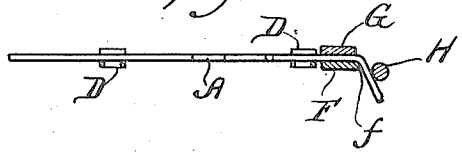


Fig. 4.



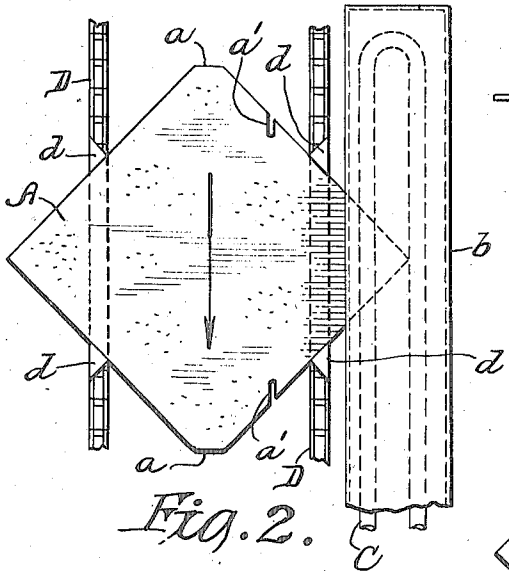


Fig. 2.

Fig. 5.

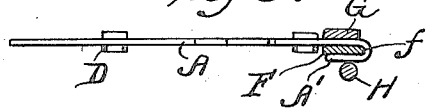
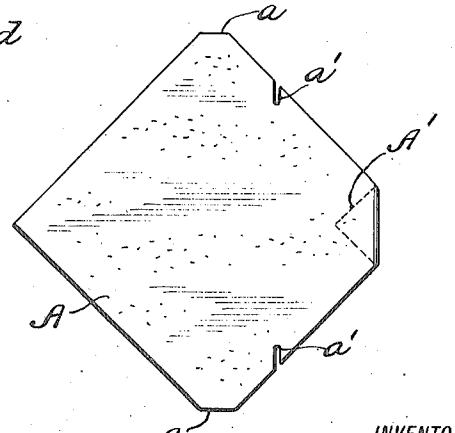


Fig. 6.



INVENTOR

Hugh MacInnes

BY

N. J. Bowhord

ATTORNEY

Patented Oct. 10, 1922. 1,431,476

UNITED STATES PATENT OFFICE.

HUGH MacINNES, OF JERSEY CITY, NEW JERSEY.

ART OF PRODUCING FLEXIBLE SHINGLES.

Application filed May 6, 1921. Serial No. 467,241.

To all whom it may concern:

Be it known that I, HUGH MacINNES, a citizen of the United States, residing at Jersey City, county of Hudson, and State of New Jersey, have invented a certain new and useful Art of Producing Flexible Shingles, of which the following is a specification.

This invention pertains to the art of making flexible shingles, whereby a flap is produced upon each shingle without cracking or breaking the shingle material.

Heretofore it has been customary to make flexible shingles by utilizing fibrous material rendered weatherproof by impregnating or saturating the same with an agent or composition of agents whereof asphaltum is the chief ingredient. In the operation of laying individual shingles on a roof or other surface, the shingles of the course are overlapped with shingles of another course or courses, leaving the lower corners exposed to view and to the weather. For fastening the individual shingles in position, it has been proposed to utilize locking means of one form or another, and among the expedients now used each shingle is provided with an underlying flap which is produced by bending the shingle material upon itself.

The fibrous material saturated or impregnated with a weatherproofing agent, such as asphaltum, is relatively stiff, and difficulty is experienced in bending such material, particularly in cold weather, for the reason that the relatively stiff material is liable to crack or break along the line of bend or fold.

By this invention it is sought to overcome the foregoing difficulty in the manufacture of flexible shingles each having a folded flap, and to the attainment of these ends the shingle material is softened by the application of heat thereto, and such shingle material while in the softened condition is bent or folded to produce the flap integral with the body portion of the shingle.

The procedure employed in carrying out this invention involves the application of heat to the flexible composite material in two ways; first, a definite portion of the shingle material is exposed to heat within a chamber, and, second, said shingle material is brought into direct mechanical contact along the line of fold with a heating element, such mechanical contact resulting in the application of a more intense heat along the line of fold than the temperature imparted to the material by the heat within the chamber. The application of heat in the manner described attains several functions in the treatment of the material. By heating a definite part of the material within the chamber, such heated section or portion is softened and rendered pliable with a view to bending or folding the same, whereas the application of a more intense heat at a definite line corresponding to the ultimate line of fold renders plastic the stiffening agent (asphaltum or its compounds), as a result of which said material is bendable upon the heated line without subjecting the material to the liability of cracking or breaking irrespective of atmospheric conditions, even in cold weather. Furthermore, the material when folded or doubled along the line rendered plastic by the application of heat is cooled in one way or another, as by exposure to the air, and the plastic agent or ingredients present in such material becomes set and hardened, with the result that the folded or doubled section retains its shape and resists any tendency to collapse or break down upon exposure to the weather or by temperature changes. This capacity of the doubled or folded portion of the flexible shingle to retain its condition is useful, more particularly, in shingles characterized by an apparently thick butt or end of the nature disclosed in a co-pending application Serial No. 463,195 filed by me on April 21, 1921.

The procedure involved in making folded shingles according to this invention is depicted in the accompanying drawings, wherein—

Figure 1 is a plan view illustrating diagrammatically the operation of feeding the shingle material successively to heating means and to folding means.

Figure 2 is a similar view showing the steps of heating a definite portion of a shingle and of applying heat at the line of fold to the shingle material.

Figure 3 is an edge view of the shingle with the heating means in cross section.

Figures 4 and 5 are views in edge elevation showing the successive stages of folding the heated shingle material by a continuous operation.

Figure 6 is a plan view of the shingle as an article when completed by the procedure of this invention.

The shingle material is of a size and shape suitable for the purpose; as shown, it is a

rectangular piece of material A with two corners cut off at *a* and provided in its edges with notches *a'* in accordance with the invention of my prior application Serial No. 463,195 to which reference has been made, but, as stated, the form and dimensions may be varied within wide limits.

According to this invention, a definite portion or area of the shingle material is exposed to the action of heat, and to this end a corner portion of said shingle material is introduced within a chamber B in which is provided appropriate heating means C. As disclosed in a companion application wherein I have claimed a machine for making shingles, the chamber B is formed by an elongated box or casing *b* positioned adjacent an endless carrier D and parallel to the path of movement of a shingle or a succession of shingles, said box or casing being provided in one of its walls with a slot *b'*. Carrier D feeds the individual shingles successively to the heating zone, and acts to carry said shingles for such a period of time as is, or may be, required to impart heat to said shingles. Said carrier acts, also, as means for feeding shingles while in a heated condition to a bending mechanism by which said material, softened or rendered plastic by heat, is doubled or folded to produce a flap A' at one corner of each shingle.

My invention in the process may be carried out by hand with the aid of appropriate heating means and bending appliances; but for rapidity and uniformity of operation and economy in production, it is preferable to employ mechanism such as disclosed in my companion application of even date herewith.

Any form of shingle feeding means may be used for transporting the shingles successively to the heating chamber and to bending means, but when a chain conveyer such as D is employed it should be provided with retaining means, indicated at *d* for precluding displacement of the individual shingles with reference to the moving parts of said carrier.

The definite part of the shingle to be heated is that area comprised within one of the corner portions of the shingle, i. e. that portion which is manipulated by folding the material to produce the flap A'. To this end, the shingles are supplied to the carrier to assume a position diagonally thereon, see Figures 1 and 2, wherein at least one corner portion of the shingle extends beyond the side of the carrier, and by locating the box or casing *b* adjacent the carrier, the shingle is moved in a path for the protruding corner portion of said shingle to travel within chamber B and the slot *b'* in box *b*, see Figure 3. Provision is thus made for exposing a definite part of the shingle to the action of heat so that the heated part is rendered more or less pliable in order that the material may be manipulated without cracking or breaking; but while said corner portion is heated throughout the area thereof, my invention involves the further or independent operation of applying a more intense heat to the shingle material at or along the line of bend or fold, which greater degree of heat application to the shingle material is obtained by the direct or surface contact of such material with a heating element which is maintained in a hot condition by an appropriate heating medium such as steam or electrical energy.

A heating element for surface contact with the shingle material at or along a line corresponding to the line of fold or bend is shown in Figures 2 and 3 as a steam pipe C positioned within chamber B and immediately below the slot *b'* so as to lie in the path of the corner portion of the shingle material. The heating pipe is thus related to the path of feed for each shingle to lodge upon and have surface contact with said heating pipe for an appreciable length of time, as a result of which the shingle material during the period of its travel within the heating zone afforded by chamber B is in surface contact at a definite line directly with the heating element, C. Such surface contact of the heating element with the material renders plastic the agent or ingredients incorporated in the shingle material, to the end that said material is bendable or foldable, even in cold weather, at or along the heated line without the possibility of breaking or cracking while undergoing said bending operation.

Although I have described the steps of heating the corner portion of the shingle material, and of applying by surface contact a greater or more intense heat at the bending line to such material, it is to be understood that said heating steps may be used conjointly as stated or one heating operation may be used independently or to the exclusion of the other, thus the surface application of heat to the shingle material at the bending line may be used without resorting to the step of heating the area afforded by the corner portion of the shingle.

In a preferred note of procedure, the step of bending the corner portion at or along the heated line of surface contact is performed subsequently to the step of heating the shingle material, and by the aid of appropriate bending or folding means positioned exteriorly of the heating chamber; but this mode of manipulating the material externally of the heating zone is not essential for the reason that the folding operation may, under some conditions, be performed within the heating zone, it being required that the bending or folding act

be performed while the material is in a softened or approximately plastic condition due to the application of heat thereto.

The bending mechanism embodied in the machine of my companion application includes certain elements which are illustrated diagrammatically in Figures 4 and 5 of the accompanying drawings, and which may be referred to briefly herein as the anvil plate or bar E, a guide and pressure bar F and a curved bar H for imparting a fold to the corner portion as the shingle is moved by the carrier D. The group of bars constituting the bending or folding means are positioned exteriorly to the heating chamber and in such relation to the line of feed that the shingle material advanced by the carrier is positioned for its heated corner portion to pass between anvil bar F and pressure bar G. Said anvil bar F is provided with a bending edge *f* of a desired cross section, either curved as shown in Figures 4 and 5, or at a right angle to the plane of the top surface of said bar upon which rests the shingle material, whereby the fold or bend may be given a curved form, an angular form, or a bend of any other appropriate form. Bar G is above and parallel to anvil bar F for holding the material in close contact therewith as the shingle is moved by the carrier and during the period of turning the carrier portion of said shingle to produce the flap A′ thereon. The shingle material, heated at the line of fold or bend, passes from the heating zone to the anvil plate or bar so as to rest into contact with the top face of said bar, the heated line of the shingle material being adjacent or next to the bending edge *f* of said anvil bar, and with this anvil bar cooperates the turning bar H, the form and relative position of which to the anvil bar is such that as the shingle material is advanced by the carrier, said heated corner portion of the shingle material is bent or doubled along the heated line of contact and around the bending edge *f* of said anvil bar, such folding or bending step being performed at successive stages or gradually during the movement of the shingle material and such folding operation being continued until the corner portion is folded beneath the body of the shingle, parallel thereto, as indicated in Figure 5 in order to produce in the shingle the underlying flap A′.

The shingle material having been bent or folded while in a heated condition to produce the underlying flap, said material is moved by the carrier away from the fold-forming mechanism and discharged from the carrier. The shingle is now cooled, by exposure to the atmospheric air, or otherwise, the effect of which is to harden the agent or agents softened by the action of heat, and thus the folded or doubled portion of the shingle becomes set for permanently retaining the shape and form given thereto by the bending edge of the anvil plate or bar.

Having thus fully described the invention, what I claim as new and desire to secure by Letters Patent is:

1. In the art of producing composition shingles, the process which consists in feeding a composition shingle blank into a heating zone, softening the material of the shingle by the application of heat to a definite part of said shingle blank material, bending or folding the material while in such softened condition, and thereafter cooling the heated portion of said shingle material.

2. In the art of producing composition shingles, the process which consists in feeding a composition shingle blank into a heating zone, applying heat to the shingle material at a line corresponding to the line of bend or fold, bending said shingle material at the heated line, and subsequently cooling the heated part of said shingle material.

3. In the art of producing composition shingles, the process which consists in feeding a composition shingle blank into a heating zone, and while said shingle blank is in movement, applying heat at a line of fold by surface contact with a heating element, bending a part of the shingle material at the heated line, and thereafter cooling the heated portion of said shingle material.

4. In the art of producing composition shingles, the process which consists in feeding a shingle blank into a heating zone, and while said shingle blank is in motion heating the shingle material at a definite line of surface contact with a heating element, and while such portion of the shingle material is in such heated condition, bending or folding the same at the definite heated line to produce a flap unitary with the body portion of said shingle material.

5. In the art of producing composition shingles, the process which consists in imparting movement to a shingle blank, exposing a definite portion of the shingle material to heat during the movement of the shingle blank, bending or folding the shingle material at a definite line while in such heated and moving condition, and thereafter cooling the heated portion of the shingle material.

6. In the art of producing composition shingles, the process which consists in imparting movement to a shingle blank, exposing during such movement a definite portion of the shingle material to the action of heat and in heating by surface contact said shingle material at a line corresponding to the line of fold, and while the shingle blank is in transit bending the heated por-

tion of the shingle material and at the heated line of contact to produce a flap unitary with the body portion of the shingle.

7. In the art of producing flexible shingles, the process which consists in feeding the shingles into heating zones and bending zones successively, heating a definite portion of each shingle while the same is moving within the heating zone, and folding the heated portion of each shingle on a definite line while said shingle is advanced within the bending zone.

8. In the art of producing flexible shingles, the process which consists in feeding the shingles into heating zones and bending zones successively, heating a corner portion of each shingle and heating the shingle material at a definite line by surface contact with a heating element during the period of moving the shingle within the heating zone, and thereafter folding the heated corner portion and on the definite heated line during the period of movement within the bending zone.

9. In the art of producing flexible shingles, the process which consists of feeding successive shingles within a heating zone and a bending zone, heating the material of each shingle by surface contact with a heating element at a line corresponding to the line of fold during the period of movement within the heating zone, folding the material of each shingle along the heated line during the period of movement within the bending zones, and thereafter cooling the heated portion of each shingle.

10. In the art of making composition flexible shingles, the process which consists in moving a shingle blank in a determined path, heating a portion of said shingle blank at a definite line while said blank is moving in said path, and bending said shingle blank along said heated line and during a continued movement thereof.

11. In the art of making composition flexible shingles, the process which consists in heating a shingle blank at a definite line crosswise of a corner portion of said blank, bending the material of said blank along the heated line and producing a flap in lapping relation to the body portion of the blank, and cooling the blank.

12. In the art of making composition flexible shingles, the process which consists in moving a shingle blank in a determined path, heating the shingle material to soften the same in a definite line crosswise of a corner portion of the shingle blank, and bending said corner portion on the heated line and producing a flap in lapping relation to the body portion of said shingle blank.

In testimony whereof I have hereto signed my name this 5th day of May, 1921.

HUGH MacINNES.