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P. F. THEOBALD

3,190,040

SELF-SEALING ASPHALT SHINGLES

Filed March 9, 1961

FIG. 1.

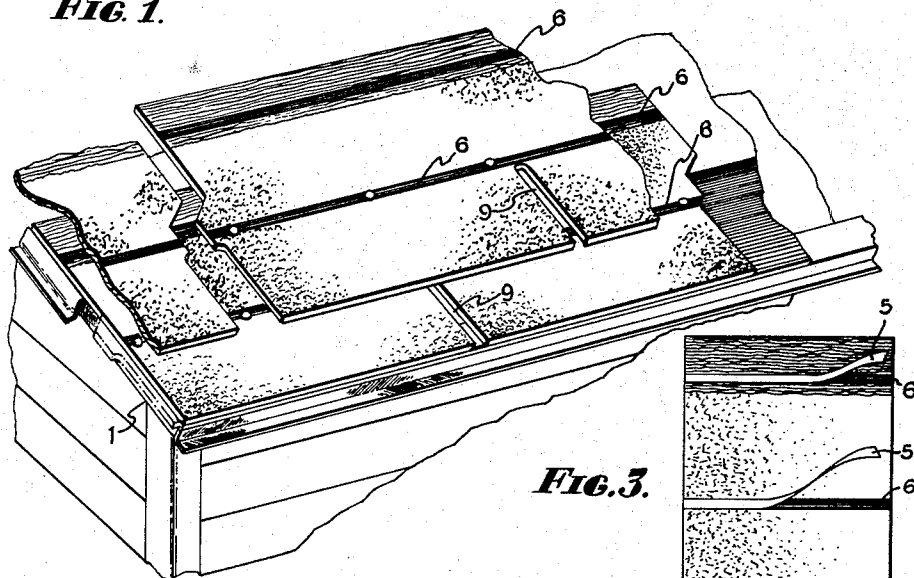


FIG. 3.

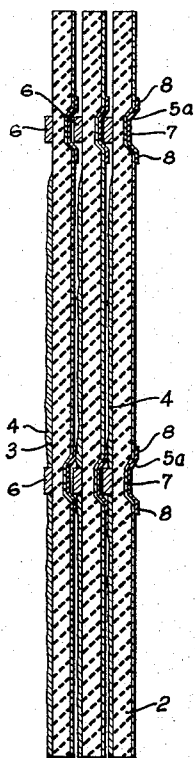


FIG. 4.

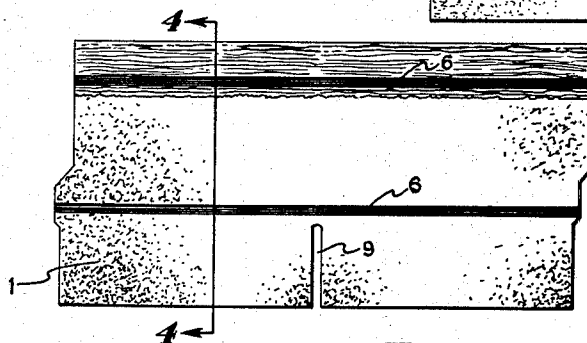


FIG. 2.

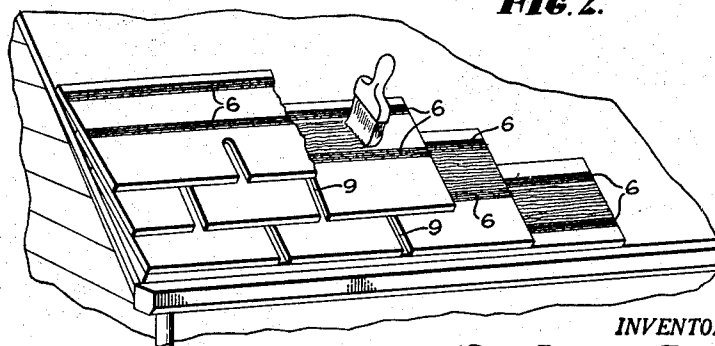


FIG. 5.

INVENTOR.
PAUL FREDERICK THEOBALD,
BY *Allen + Allen*
ATTORNEYS.

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SELF-SEALING ASPHALT SHINGLES

Paul Frederick Theobald, North Hatley, Quebec, Canada,
 assignor to The Philip Carey Manufacturing Company,
 Cincinnati, Ohio, a corporation of Ohio
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 4 Claims. (Cl. 50—83)

This invention relates to self-sealing asphalt shingles, and more particularly to an improved shingle having adhesive properties that are developed by exposure to the heating effect of solar radiation under normal atmospheric temperatures. After the shingles have been applied by nailing on the roof, the solar heat sensitive adhesive will, under normal conditions of use, become softened and tacky so as to develop a strong adhesive bond with the overlying contacting surfaces of the shingles in the immediately overlying course, and thus seal the tabs so that they become highly resistant to blowing up or blowing off when exposed to high velocity winds.

The improved shingle of this invention is particularly adaptable to production in a generally rectangular strip form and with narrow slots or cut-outs extending upwardly from the lower horizontal edge of the strip, such slots defining multiple rectangular exposed tabs, although it may also be made in the form of individual so-called jumbo shingles of large dimensions. Such strip shingles are adapted to be laid in overlapping courses with the lower edges of the tabs in alignment with the tops of the cut-outs in the next underlying course, thus giving the appearance of rectangular individual shingle tabs on the roof as laid. Such shingles are usually termed strip shingles and normally are dimensioned so that, as laid on the roof, they provide at least double coverage of the deck and at least two inches of headlap. Thus for example, a strip shingle having a cut-out length of 7 inches would provide a tab exposure of 7 inches and would be at least 16 inches high. The width of the tab, the number of tabs per strip, and the length of the strip may be varied depending upon the tab dimensions requisite for the desired appearance and upon convenience in handling and application of the shingle units. If desired, triple coverage for the roof may be provided by making the shingle 21 inches high for a tab exposure (cut-out length) of 7 inches. These dimensions are stated only as exemplary in respect to shingle tab and overall height dimensions, and it is obvious that the shingle tabs may be of any desired dimension as to exposure and length, within practical limits of manufacture and application. In the usual practice of the asphalt roofing industry, square tab strip shingles have been produced with tab exposures ranging from 4 to 8 inches and with two to four tabs per strip.

One of the principal objects of my invention is the provision of self-sealing asphalt shingles which are not only highly wind resistant, but also extremely resistant to leakage after application on a roof. In many climatic areas an asphalt shingle roof may be subjected to high velocity wind-driven rain, as a result of which water is forced underneath the tabs and up over the headlap of the shingle. Another exposure condition that may cause a shingle roof to leak is the formation of "ice dams" by snow and ice on the roof; above such dams water from melted snow may back up underneath the shingles until it flows over the headlap. Leakage is particularly likely to be caused by these conditions where the roof deck has a low slope, such as less than 4 inches rise per horizontal foot. The improved shingle of this invention is particularly suitable for application as a leak-resistant roof covering on decks having slopes between 2 and 4 inches per horizontal foot. This enables asphalt shingles to be

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satisfactorily used as a roof covering on low slopes where otherwise a built-up roofing would be required. The improved shingle of this invention may, of course, also be used on roof slopes greater than 4 inches per horizontal foot and realize the same advantages as at lower slopes although to a somewhat lesser degree.

A principal feature of the improved asphalt shingle of this invention is that the solar heat sensitive adhesive is applied to the upper granule coated surface of the shingle as a plurality of spaced apart bands or stripes located above the exposure area (tab) of the shingle and extending laterally across this surface, generally parallel to the lower tab edge of the shingle. While several such spaced apart stripes of adhesive may be used, normally two will be adequate for secure sealing of the shingles. Where two such solar-heat-sensitive adhesive stripes are used the lower stripe is preferably positioned above but near the top of the cut-outs so that it adheres to the overlying shingle tab near its lower edge. The distance of the adhesive stripe above the cut-out may conveniently be from 1/2 inch to 2 inches, depending on the overall height dimension of the shingle. The second or upper adhesive stripe preferably is positioned in the headlap area of the shingle and its distance from the lower edge of the shingle is therefore more than twice the exposure length of the tab. If for example the tab length is 7 inches, the second adhesive stripe may conveniently be about 15 inches above the lower horizontal exposed edge of the shingle. This spacing apart of the adhesive stripes provides boundary indicating lines for a wide area therebetween on the upper surface of the shingle.

My improved self-sealing asphalt shingle is produced with granular mineral surfacing embedded in the coating layer on the greater part of its upper surface. The exposed tabs are covered with granules and the granule surfacing extends over the unexposed area to a height such that no unsurfaced coating is exposed in the cut-outs when the shingles are applied. The upper part of the headlap area need not have granule surfacing. The solar-heat-sensitive adhesive stripes are applied on the upper surface of the shingle as it traverses the roofing machine. The lower adhesive stripe is applied on the granule surfaced portion above the exposure area, and the upper stripe, where only two are used, may be on the granule surfaced portion or may lie in the unsurfaced portion of the headlap area.

It will be readily apparent that the uppermost adhesive line, when sealed to the overlying shingle as a result of solar radiation after the shingles have been nailed on the roof, provides a barrier, in the headlap area, to the passage of rain driven into the cut-outs by high velocity winds.

Another important object of my invention is the provision of self-sealing asphalt shingles in which the spaced apart stripes of solar heat sensitive adhesive also may serve as indicia or boundary indicating lines for a substantially wide area of the unexposed portion of the upper surface of the shingle upon which area a brushed on, tacky adhesive may be spread as the shingles are being applied on the roof. A suitable adhesive is an asphalt cut-back (solvent) cement, although melted hot asphalt may be used if desired. This adhesive may be applied by brushing, mopping, spraying, roll coating or other spreading means. The roof covering thus produced has the shingle tabs of the overlapping courses cemented together over almost their entire area, with the result that leakage and wind damage are virtually eliminated even under extremely severe exposure conditions and on roofs of low slope.

A particularly important feature of my invention is the provision of means to prevent the boundary indicating stripes of solar heat softening adhesive from causing the

shingles to stick together in the packages under the pressure imposed by the heavy weight of the bundles when stacked in storage and during shipment. For this purpose I provide each adhesive stripe with a registering band of non-adhesive or adhesive-repellent tape applied in such positions on each shingle that when the shingles are stacked in the packages the band of tape is interposed between the adhesive stripe and the next overlying shingle. Thus the adhesive stripes are prevented from adhering to the surfaces of adjacent shingles in the bundle.

This adhesive-repellent tape may be applied overlying the adhesive stripe on the upper surface of the shingle, however, preferably it is applied on the under surface of the shingle and in alignment with the adhesive stripe. In this arrangement of the tape in relation to the stripe, it is especially advantageous to apply the tape within and overlapping the sides of a so-called nesting groove on the under surface of the shingle. The advantage of applying the tape in a nesting groove on the under surface is that the tape then does not need to be removed when the shingle is applied, whereas if the tape is applied overlying the adhesive stripe on the upper surface it is necessary to pull off the tape at the time the shingles are being applied, to expose the solar-heat-softening adhesive so that it can function to seal the tabs.

A suitable adhesive-repellent tape for use with the solar-heat-softening adhesive may be regenerated cellulose film (of the kind commonly known as cellophane) or a thin, strong, paper that has been surface treated to render it non-adhesive to asphalt.

As the solar-heat-softening adhesive for sealing the tabs of my self-sealing shingles I have found that a special asphaltic composition is desirable. This may be a blend of asphalts, or asphalts and resins, characterized by the special property of high susceptibility to change of hardness with temperature. Thus, the asphaltic composition should be relatively hard and non-adhesive at temperatures below 100° F., but become softened and tacky at high temperatures so that under the effect of solar heat at surface temperatures of say, 115° F. and higher, it rapidly develops a strong adhesive bond with the under surface of the immediately overlying shingle on the roof. The composition of the adhesive may be varied considerably provided it possesses the essential characteristics above described.

To enable my invention to be understood more fully and to illustrate its objects and advantages, reference is made to the following detailed description of several preferred modifications and features of the invention and to the accompanying drawing in which:

FIGURE 1 is a perspective view showing the shingles of my invention applied to a roof. In this illustrated embodiment of the invention the tapes have been applied on the under surface of the shingle and are therefore not visible.

FIGURE 2 is a detailed plan view of my invention as embodied in a rectangular strip shingle with the tapes applied on the back surface (not shown).

FIGURE 3 is a plan view of an embodiment of my invention utilizing a large individual or so-called jumbo type shingle. As shown, the adhesive stripes have adhesive-repellent tape overlying the stripes on the upper, granule coated surface of the shingle.

FIGURE 4 is a detailed section of three shingles in the relation they occupy in the package with the individual shingles being shown in cross-section taken on the line 4-4 of FIGURE 2, and with the shingles shown slightly spaced for clarity of disclosure.

FIGURE 5 is a fragmentary perspective view showing the shingles of the present invention applied to a roof in a triple coverage arrangement and showing the application of asphalt adhesive between the stripes of solar-heat-softening adhesive.

Referring to FIGURE 2, it will be seen that the shingle has a cut-out slot 9 defining two exposure tabs and the

total height of the shingle is three times the length of the slot. Such shingles when laid in overlapping courses, with the lower edge of the tabs along the line of the tops of the cut-outs, will therefore provide triple coverage for the roof deck. It is also shown that my improved self-sealing shingle has granular mineral surfacing embedded in the coating layer on the weather surface to a height above the lower tab edge somewhat greater than twice the length of the cut-out slot. Thus no unsurfaced asphalt coating will be exposed in the cut-out when the shingles have been applied.

FIGURE 4 illustrates the structural features of the shingle of my invention in its preferred form. The shingle is made from a web of roofing felt 2 impregnated with an asphalt saturant and coated with asphalt 3 in which mineral granules 4 are embedded on the upper surface. The under surface also carries an asphalt coating which is dusted with talc, mica or other suitable finely divided anti-stick mineral material.

The stripes of solar-heat-sensitive asphaltic adhesive 6 on the upper surface are shown as being in alignment with the adhesive-repellent tapes 5a laid in the nesting grooves 7 in the coating on the under surface of the shingle. These tapes are shown as being substantially wider than the adhesive stripes and also wider than the nesting grooves so that they extend up over the edges 8 of the grooves. The adhesive stripe may conveniently vary from 1/2 inch to 3/4 inch in width, the nesting groove may range from 7/8 inch to 1 1/4 inches and the tape may range from 1 1/4 to 1 1/2 inches in width. The thickness of the stripe for effective sealing of the tabs may range from 0.005 to 0.020 inch.

Whether the tape is applied overlying the adhesive stripe, as in FIGURE 3, or on the undersurface of the shingle, as in FIGURE 2 and FIGURE 4, I have found it desirable to provide a nesting groove 7 in the coating of the under surface in alignment with the adhesive stripe. This nesting groove provides a protective space for "nesting" of the adhesive stripe when shingles are stacked in the package and reduces the tendency for the adhesive stripe to flatten out under the pressure in stacked loads of shingle packages. The nesting groove may vary from 0.010 to 0.030 inches in depth, depending on the thickness of the adhesive stripe which is to be protected.

The nesting groove is easily formed during the manufacture of the shingle by scraping off the asphalt coating that was applied on the under surface, directly underlying the adhesive stripe, to the desired width. This is done while the asphalt coating is still hot and relatively fluid. The tape is then applied overlying the nesting groove and overlapping the side edges.

The improved self-sealing shingles of my invention are packaged in the conventional manner for asphalt strip shingles, that is, they are stacked back to face and with the tab edges together in the bundle. When so packaged they have no tendency to stick together even in heavy loads and are easily separated in the usual manner. No special arrangement, such as reversing every other shingle or of packaging in pairs back to back, is necessary, as was the case with some previous attempts to solve the problem of packaging self-sealing shingles.

The embodiment of my invention shown in FIGURE 3 utilizes a generally rectangular individual shingle of large dimensions commonly termed in the roofing industry a "jumbo" shingle. In this embodiment, by way of example, the tapes 5 are shown as applied directly to the adhesive stripes 6. The dimensions of each shingle unit may be as great as 18 inches by 24 inches or even greater. Such individual shingles may be laid with any desired coverage and headlap to provide either double or triple coverage for the roof. If, for example, the shingle is laid with the 18 inch dimension as the tab edge, parallel to the eave, it may provide 10 1/2 inch exposure, double coverage and a 3 inch headlap. For triple coverage the maximum tab exposure of this shingle would be 8 inches.

For double coverage application the lower adhesive stripe may be located about 11 to 12 inches above the tab edge and the upper adhesive stripe about 2 to 3 inches below the top edge of the shingle. The width of the area defined by these boundary indicating adhesive bands will then range from 9 to 11 inches, in which area a brushed on adhesive may be spread while the shingles are being applied to the roof.

The strip shingle embodiment of my invention shown in FIGURE 2, when made with a tab exposure (cut-out length) of 7 inches, may conveniently have the adhesive stripes spaced from 7 to 9 inches apart. Thus if a brushed-on adhesive is applied, in the area between these boundary indicating lines, this results in substantially the entire area of the overlying shingle tab being cemented to the underlying course. Reference to FIGURE 1, which shows the method of applying my self-sealing strip shingles, shows that this is the case, also that the shingles are cemented together in a considerable portion of their headlap area as well.

In addition to serving as indicia for the extent of the area to which a brushed-on, tacky adhesive may be applied, it will be evident that these solar-heat-softening adhesive stripes, due to their substantial thickness in the range of 0.005 to 0.020 inch, also are effective to confine the brushed-on adhesive to prevent it from flowing down and mutilating the appearance of the exposure area of the shingles while the adhesive is being applied or afterward.

A further advantage derived from applying my improved self-sealing shingles with a brushed-on adhesive within the area defined by the boundary and adjacent to the indicating stripes of solar-heat-softening adhesive is that the softer asphalt in the brushed-on adhesive naturally tends to commingle with and soften the harder asphalt of the stripes. This results in making the asphalt of the stripes more readily reactive to the softening effect of solar heat so that it becomes possible to seal the tabs at a lower temperature. Thus the spaced apart adhesive stripes not only confine the brushed-on adhesive within the area defined, but also the adhesive stripes themselves become more effective in respect to their adhesive susceptibility so that the tabs seal more rapidly and develop a stronger bond.

Having now fully described my invention in detail, with various exemplary embodiments thereof, it will be understood that various modifications and changes may suggest themselves to those skilled in the roofing art. The scope of my invention is not to be considered as limited by the specific details herein set forth, but only as defined by the subjoined claims.

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

1. A self-sealing asphalt shingle of substantially rectangular shape and having cut-outs in the exposure area thereof, defining a plurality of tabs, and adapted to be laid with other similar shingle elements as lapping courses in a double coverage arrangement, said shingle having granule surfacing embedded in at least all the weather-exposed asphalt coating area of its upper surface as applied in said lapped courses on the roof, spaced apart continuous stripes of a solar heat softening adhesive extending parallel to the lower edge of the shingle entirely across the upper surface of said shingle in the area thereof which will, when laid on a roof, be covered by an overlying shingle, the upper one of said stripes being disposed in the headlap area at a distance from the lower edge of

the shingle more than twice the exposure length of the tab, and the lower one of said stripes being disposed immediately above the top of the cut-outs, said stripes providing boundary indicating lines for an area therebetween about as great as the exposure area of the shingle, and adapted to receive a brushed-on asphalt adhesive, and means to prevent sticking between the adhesive stripes of one shingle, and an adjacent shingle when packed together, said shingle when positioned and nailed on a roof in lapped courses with said other similar shingle elements providing a sealed roof covering capable of withstanding water leakage and high velocity winds.

2. A self-sealing asphalt shingle according to claim 1, in which said means comprises a tape covering each of said adhesive stripes, said tape being wider than said stripes.

3. A roof covering having high wind resistance and high resistance to leakage resulting from high velocity wind-driven rain, said roof covering comprising a plurality of similar flexible shingles laid in at least a double coverage arrangement, wherein the most underlying shingle has a headlap of not less than two inches, so that in the headlap area, portions of three shingles are superposed upon each other, each of the shingles in said double coverage arrangement comprising a substantially rectangular body having tab defining cut-outs and having granule surfacing embedded in at least all the weather-exposed asphalt coating area of its upper surface as applied in said double coverage arrangement, and having spaced apart continuous stripes of solar heat softening adhesive extending parallel to the lower edge of the shingle entirely across the upper surface of said shingle in the area thereof which is covered by an overlying shingle, the upper one of said stripes being disposed in the headlap area at a distance from the lower edge of the shingle more than twice the exposure length of the tab, and the lower one of said stripes being disposed immediately above the top of the cut-outs, said stripes providing boundary indicating lines for an area therebetween about as great as the exposure area of the shingle, said stripes providing a double barrier to wind-driven rain.

4. A roof covering according to claim 3, wherein the area between said spaced apart stripe of solar heat softening adhesive is provided with a layer of asphalt cut-back adhesive.

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EARL J. WITMER, *Primary Examiner.*

WILLIAM I. MUSHAKE, *Examiner.*