Jan. 26, 1954 G. W. CLARVOE ET AL 2,667,131

SELF-SEALING SHINGLE

Filed Oct. 28, 1948 2 Sheets-Sheet 1

Fig. 1

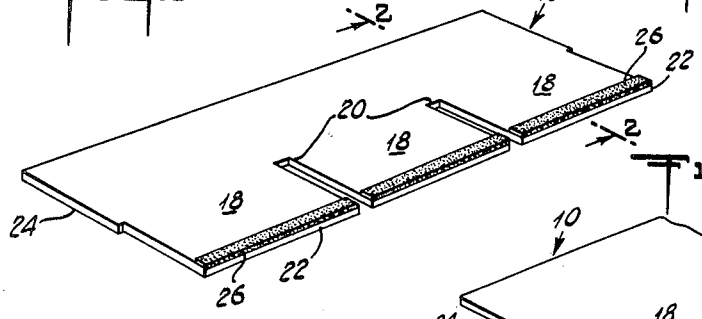


Fig. 2

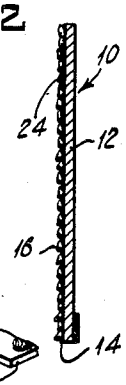


Fig. 11

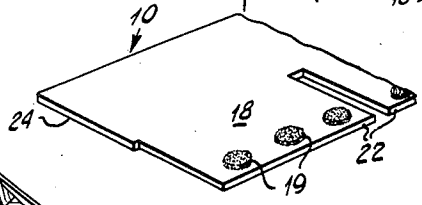


Fig. 4

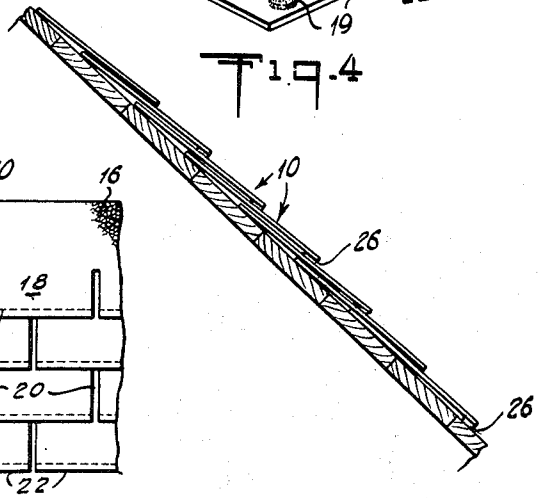


Fig. 3

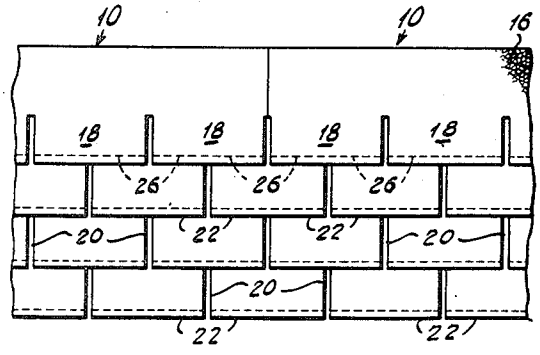


Fig. 5

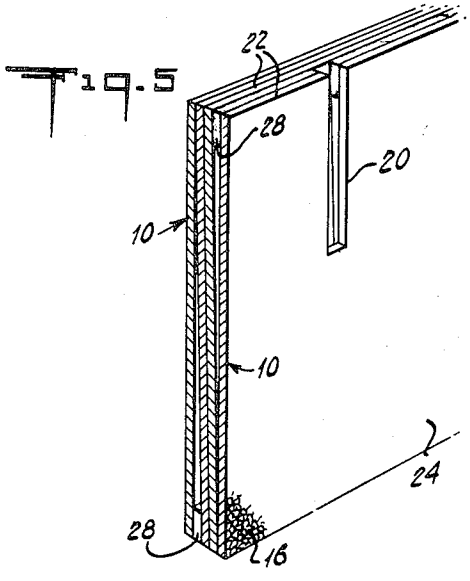
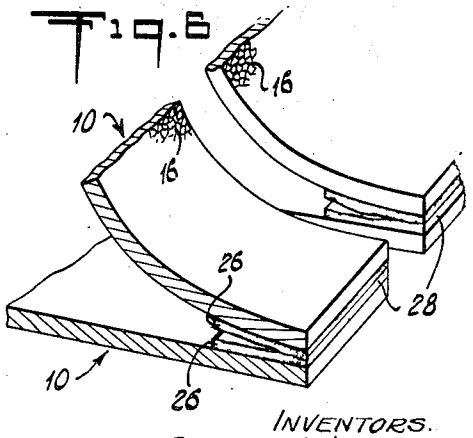


Fig. 6



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SELF-SEALING SHINGLE

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Fig. 7

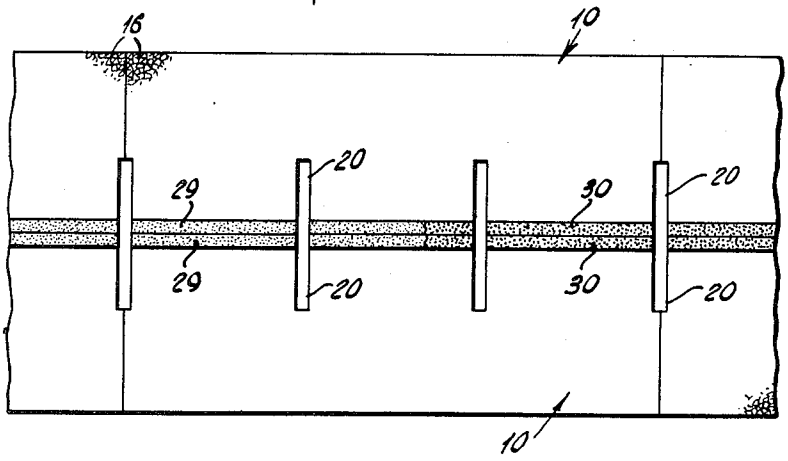


Fig. 8

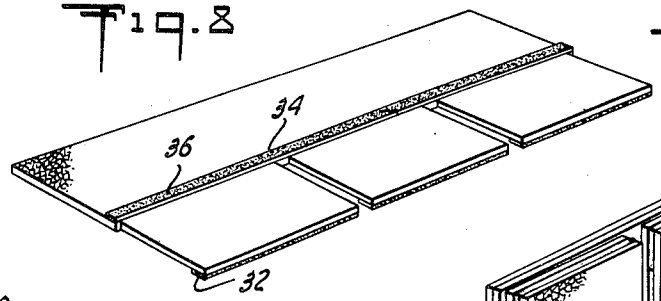


Fig. 10

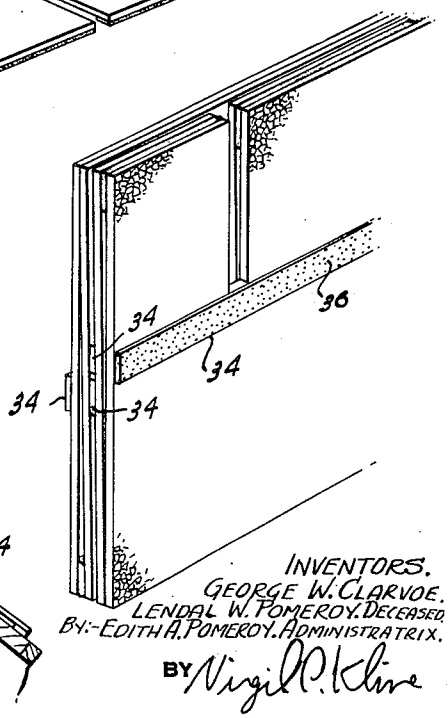
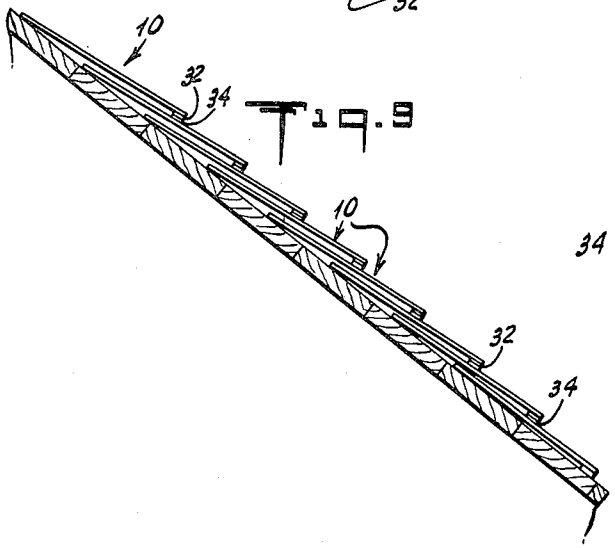


Fig. 9



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2,667,131

UNITED STATES PATENT OFFICE

2,667,131

SELF-SEALING SHINGLE

George W. Clarvoe, Somerville, N. J., and Lendal W. Pomeroy, deceased, late of Newark, N. J., by Edith A. Pomeroy, administratrix, Newark, N. J., assignors to Johns-Manville Corporation, New York, N. Y., a corporation of New York

Application October 28, 1948, Serial No. 56,932

9 Claims. (Cl. 108—7)

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The instant invention relates to flexible roofing or siding shingles and like covering elements and, more particularly, to an improved shingle which provides a commercial solution of the problem raised by the tendency of unsecured exposure portions of such elements to lift and curl under the influence of high winds. This application is a continuation in part of the co-pending application of George W. Clarvoe and Lendal W. Pomeroy, Serial No. 721,598, filed January 11, 1947. The conventional, asphalt-impregnated and coated felt base flexible strip shingle having a headlap area to be covered by the shingles of one or more higher courses and exposed tabs is a primary example of the shingle which presents the problem under discussion, and the following description will be directed particularly to it, but it will be understood that the invention is equally applicable to other covering elements where similar problems are involved. The lifting or curling of the tabs is highly objectionable as it not only imparts an unsightly appearance to the roof or wall, but permits the access of rain, snow and the like to the underlying roof structure. Furthermore, in unsually high winds or where the tabs are repeatedly lifted or bent they may be entirely torn away.

Numerous proposals have been made heretofore in attempts to solve these difficulties but none of the prior proposals has proved to be of sufficient merit for commercial adoption. For example, it has been suggested that an adhesive such as asphalt be applied to the under face of the tabs after the shingles have been laid to secure the tabs to the underlying roof structure, but the extra labor involved and the messiness of the operation have prevented this expedient from going into wide use. Also, a number of different attempts have been made to apply stripes of adhesive to the under faces of the tabs, or to the upper faces of the headlap portion where they will be overlapped by the tabs of a next higher course, during manufacture of the shingles. As will be appreciated, for these proposals to be successful it is necessary for the adhesive stripes to be of a character to adhere the shingles when laid and at the same time not to stick the shingles together in the bundle to such an extent that they will be injured when separated. The principal prior efforts in this connection have approached the problem from the standpoint of originally covering the stripe of adhesive with an anti-stick material which will prevent the adhesion of the shingles in the bundle but which will wash away or otherwise lose its protecting function when

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the shingles are laid. Because of the failure of the expedients employed to adequately accomplish these results or the high cost and difficulties of employing the special compounds required, or both, these proposals have failed of adoption for commercial production.

The principal object of the instant invention is the provision of a flexible shingle or like covering element having a factory-applied adhesive patch, suitably in the form of a stripe or spot, of a character and location to insure adherence of the exposed butt tab of a shingle to an underlying shingle or other supporting structure. Another object of the invention is the provision of such shingle which can readily be separated from a bundle of like shingles without injury, even at the relatively extreme elevated temperatures normally encountered in the bundles in shipment and storage prior to application. In accordance with the instant invention the shingles are arranged in the bundles in pairs with corresponding sides of each pair adjoining, and with a patch of adhesive secured to both. The adhesive is of such character that it may be readily fractured, even at the extremes of the temperatures normally encountered in the bundles, to separate the shingles and provide an adhesive area on each shingle and, when fractured, will present bright, clean surfaces. These surfaces have wetting and adhesive properties, particularly under solar radiation whereby, when the shingles are laid, the adhesive will, under normal conditions of use, wet and adhere to an underlying surface such as the granular surface of a shingle of a lower course.

A still further object of the invention, in one embodiment, is the provision of a shingle carrying a second patch of adhesive in position to be contacted by the first-mentioned adhesive of a lapping shingle.

A still further object of the invention is the provision of a shingle bundle comprising a plurality of pairs of shingles with the shingles of each pair secured together by adhesive of the type referred to above.

Our invention will be more fully understood and further objects and advantages will appear when reference is made to the following detailed description of a preferred embodiment of the invention and to the accompanying drawings in which:

Fig. 1 is a perspective view of a shingle embodying the instant invention, the shingle being inverted to show its under face;

Fig. 2 is a sectional view on an enlarged scale, taken on the line 2—2 of Fig. 1;

Fig. 3 is a view of a section of a roof covered with shingles of the instant invention;

Fig. 4 is a sectional view taken through a roof section such as that in Fig. 3;

Fig. 5 is a perspective view illustrating the arrangement of the shingles in the bundle or package;

Fig. 6 is a perspective view illustrating the manner of separating the shingles of a pair in preparation for laying;

Fig. 7 is a plan view illustrating the arrangement of the lanes of adhesive on the shingles during their manufacture, the figure also illustrating a further feature of the invention;

Fig. 8 is a perspective view of a shingle illustrating a modification of the invention;

Fig. 9 is a view similar to Fig. 4 of shingles in laid relationship on a roof, the shingles, however, being of the modified form of Fig. 8;

Fig. 10 is a perspective view illustrating the arrangement of the modified shingles in a bundle or package; and

Fig. 11 is a view similar to Fig. 1 illustrating a modified arrangement of the adhesive.

Referring now particularly to Figs. 1–6 inclusive, the invention is shown as embodied in an otherwise conventional strip shingle **10**. Such conventional strip shingles, as is well known in the art, are usually prepared from a roofing felt **12** (see Fig. 2) as a base, the felt being saturated with a waterproofing compound such as a relatively low melt point asphalt. On the surface to be placed uppermost, a suitable weather-protecting covering is used which may take different specific forms but in a simple form, as shown, consists of a coating **14** of relatively high melt point asphalt and a surfacing **16** of a mineral grit, such as crushed slate. The under face of the shingle may carry a thin back coating of asphalt and a surfacing of mica, talc or the like (not shown). The exposure area of the shingle is divided into a plurality of tabs **18** by slots or cut-outs **20** extending from the butt edge **22** to a headlap area **24** whereby, when the shingles are laid as illustrated in Fig. 3, they simulate the appearance of a plurality of individual shingles. Due to the flexible characteristics of a shingle of this type and to the fact that, in the normal case the tabs **18** are entirely unsecured, it frequently happens, as pointed out above, that the tabs are lifted or curled back and sometimes completely torn off under the action of high winds.

In accordance with the instant invention the shingles are provided with means to positively secure the tabs to an underlying course, this means comprising a patch **26** of a fracturable adhesive of a character to wet and adhere to a juxtaposed surface, particularly when the shingle is subjected to solar radiation at normal temperatures. The patch of adhesive preferably takes the form of a continuous lane or stripe extending across, or substantially across, the shingle tab, as shown in Figs. 1, 3, 5, 6, 7, 8 and 10, but it may consist of a spot or a series of spots of adhesive, as illustrated, for example, at **19** in Fig. 11. Consequently it will be understood that, when the terms "lanes" or "stripes" are used hereinafter, they should be construed in a sense to include both continuous and discontinuous bands and also adhesive patches of other shapes and extent providing a sufficient adhesive area to secure the tabs to the underlying shingles or roof structure. The adhesive stripe is preferably placed, as shown, on the under face of the shingle at or adjacent, say within ½'' of, the butt edges of the

tabs whereby, when the shingles are laid up as illustrated in Figs. 3 and 4, the tabs will be secured at their butt edges to prevent lifting. The stripes may be of different widths, depending upon the area of adhesion desired. For example, the width may be from ⅜'' to 2'' where the stripes extend across, or substantially across, the shingle tab. The thickness of the stripes is not critical as long as sufficient material is present to provide a full cementing contact with the rough granular surface of an underlying shingle, such thickness being, say, .020''.

The fracturable nature of the adhesive is utilized to enable the shingles to be readily separated in the bundle and is also utilized to secure the bright, clean, fractured surfaces needed to insure adherence to a roof surface, such as the granular surface of the shingle overlapped. In the preparation of the shingles of Figs. 1 and 2, adhesive lanes are applied to the under face of the roofing sheet after any other coating and surfacing operations are performed and suitably prior to its separation into individual strip shingles. One manner in which the adhesive stripes may be applied and the shingles cut from a roofing sheet of a width to accommodate two lanes of shingles is diagrammatically illustrated in Fig. 7, the adhesive stripes being shown at **29**. Alternatively, the adhesive stripes may be applied to the shingles after completion of the normal operations. The application is made, say, by narrow coating rolls or the like (not shown) located to apply the adhesive lanes to the under surface of the sheet or the cut shingles, as the case may be, at or, say, within ½'' of the butt edges.

The shingles carrying the stripes of adhesive are paired with the adhesive stripes of each pair in contiguous relationship and packages or bundles are made up of a plurality of such pairs, with alternate pairs preferably having their butt edges at opposite sides of the package, as illustrated in Fig. 5. The contiguous stripes of adhesive weld together to become, in effect, a single, homogeneous, relatively heavy or thick stripe **28** (see Fig. 5) securing the shingles of each pair together.

Upon opening the bundle to remove the shingles for application to a roof or side wall, the shingles of each pair may be readily separated by fracturing the connecting stripe of adhesive compound, even at the highest temperatures which are normally encountered in the bundles in shipment and when stored in the open in the summer months at the scene of application. The latter temperatures may run in the order of 130° F. or above. This is suitably done by grasping the shingles adjacent their edges opposite the butts and moving them apart, as illustrated in Fig. 6. The frangible nature of the adhesive and its firm adherence to the rear faces of the shingles permits it to break or fracture intermediate its thickness to leave a final lane **26** at or adjacent the butt edge of each of the shingles. The shingles are then laid in the customary manner and, after a suitable period of time, the length of which will depend upon the weather conditions to which the roof is subjected, the adhesive will wet and adhere to the underlying shingle or other supporting structure to secure the tabs against lifting.

Various thermoplastic compounds fracturable at normal temperatures and having the ability to wet and adhere to surfaces such as the granular surfaces of shingles, may be employed. The compounds preferred for this purpose are petroleum resins, pressure still pitches,

coal tar pitches and related bitumens of similar characteristics with or without additional modifiers, such as various types of petroleum, coal tar or natural or synthetic resins, the compounds having physical properties lying within or substantially within the limits given below:

	Min.	Max.
Melting Point, Ring and Ball.....°F.	175	200
Penetration at 77° F., 100 grams, 5 seconds	1	8
Penetration at 115° F., 50 grams, 5 seconds	5	20
Flow at 160° F., 6 hours 45° angle, ½" cube, Barrett Test.....inches	½	4
Saybolt Furol Viscosity at 350° F., seconds	100	250
Asphalt Viscosity Index	3.5	6.5
Impact Test—¼" x 3" Diameter Disc Single Blow at 115° F., inch-pounds		5.0

Typical examples of specific compounds meeting the above requirements are as follows:

Example 1

	Percent
Petroleum resin	100

Example 2

Petroleum resin	20
Asphalt (150–155° F., M. P.)	20
Pressure still pitch (210–220° F., M. P.)	60

Example 3

Blended steam refined asphalt (140–150° F., M. P.)	40
Pressure still pitch, 210–220° F., M. P.)	60

Example 4

Petroleum resin	25
Residual asphalt (220–250° F., M. P.)	37½
Pressure still pitch (210–220° F., M. P.)	37½

In the above formulae the melting points are determined by the conventional ring and ball test. The petroleum resins in Examples 2 and 4 are resins of high susceptibility and having melting points of the order of 130° F.

Compounds meeting the above requirements are hard and frangible at normal temperatures whereby they may be readily fractured but still have the ability to wet and adhere to other surfaces. They are inexpensive and may be easily applied. It will be understood that the terminology "normal temperatures" or "normal ambient temperatures" as employed herein refers to that range of temperatures to which the bundles of shingles may normally be expected to be subjected in shipment or in storage at the scene of application of the shingles to a building, a range which thus may extend from substantially below room temperatures to the more significant elevated temperatures ranging as high as 130° F. and above, as reached in the bundles stored in the open on warm summer days and particularly under a bright sun.

Inasmuch as it is preferred that the patch or lane of adhesive **28** connecting the shingles of a pair be divided relatively equally between the shingles after their separation, means may be employed to control the line of fracture. Referring particularly to Fig. 7, this means may consist of a discontinuous layer **30** of a parting compound, such as talc, silica dust, slate dust, mica, or the like, or an inorganic, water-soluble salt such as sodium chloride or a water-soluble compound such as glue, gelatin, sugar, or the like, applied to the adhesive lane **29** on one or both of the shingles of the pair prior to their being placed together. The term "discontinuous"

as applied to the layer of parting compound means that the layer is not of such character as to prevent consolidation or welding of the lanes. In other words the layer is relatively thin and spotty whereby it merely provides a weakened zone in the composite stripe of adhesive formed by the welding of the individual lanes. As a result, when separating forces are applied to the pair of shingles, fracture will tend to take place along the weakened zone and the lanes of adhesive remaining on each of the shingles will be of approximately uniform and equal thickness. Furthermore, the parting compound, when used in a discontinuous layer of this type, will not prevent the adhesive lanes from performing their cementing function after application of the shingles. Where a material such as salt, sugar or other water-soluble compound is used as the parting material, the natural moisture which enters to some extent between the shingles during rain storms or during conditions of high humidity, will dissolve and wash away the material to eliminate any possibility of substantial interference with the adhering functions of the adhesive lanes.

Referring now to Figs. 8–10 inclusive, a modification of the invention is disclosed in which, in addition to the stripe of adhesive underlying the butt portion of the shingle, such stripe being referred to in these figures by the reference character **32**, a second stripe of adhesive **34** may be employed in position to be overlapped by the entire width, or a portion of the width, of the adhesive stripe **32** of the shingle of an overlying course when the shingles are laid with the normal overlap. For this purpose stripe **34** is placed at or adjacent the tops of the slots, depending upon whether the stripes **32** are at or somewhat removed from the butt edges. Stripes **34** may be from ½" to 2" in width, similarly as the stripes adjacent the butt edges.

The compound making up adhesive lane **32** is preferably the same as that employed in the embodiment of Figs. 1–7 inclusive. The compound for adhesive lane **34** may also be the same compound previously described or, in this case, may be simply a conventional shingle coating asphalt, inasmuch as it functions mainly as a receiving surface for adherence of the lanes **32**. Lane **34** is provided with a continuous covering **36** of a parting compound, suitably any of those referred to above. The shingles are paired as before with adhesive lanes **32** in juxtaposed relationship whereby they weld together to form a substantially integral, homogeneous, relatively thick connecting link between the shingles. In the bundle the pairs are placed as before with the butt edges of alternate pairs at opposite sides of the bundle.

The shingle constructions described above and either with or without the additional lane **34** provide the shingles with factory-applied means for insuring their adherence to underlying shingles when the roof or other surface on which they are laid is subject to normal solar radiation. The use of the fracturable adhesive of the character described permits the shingles to be bundled or packaged in a substantially conventional manner and at the same time permits them to be readily separated. Fracture of the adhesive necessary to separate the shingles provides clean, bright adhesive surfaces which readily adhere to rough surfaces.

Having thus described our invention in rather full detail, it will be understood that these details

need not be strictly adhered to but that various changes and modifications may suggest themselves to one skilled in the art, all falling within the scope of the invention as defined by the subjoined claims.

What we claim is:

1. A pair of prepared asphaltic exterior covering sheets each having front and back surfaces and arranged with one of said surfaces of one sheet facing one of said surfaces of the other sheet, and fracturable means connecting the sheets together, said fracturable means comprising a bituminous compound fracturable at normal temperatures and having high wetting characteristics and high adhesive characteristics under solar radiation at normal temperatures, said compound having a ring and ball softening point of the order of 175° F. to 200° F. and a penetration at 115° F., 50 grams, 5 seconds, in the range of 5–20, said compound being capable of adhering firmly to either of said surfaces exhibiting the same compound or exhibiting a different substance and capable of splitting substantially medially when the sheets of a pair are separated by fracture of said compound, so that when laid with said compound against a surface, the compound will wet and adhere securely to the surface under solar radiation at normal temperatures.

2. The invention defined in claim 1, and said compound further having a viscosity, Saybolt Furol at 350° F. of 100–250 seconds and an impact resistance (impact test—¼'' x 3'' diameter disc single blow at 115° F.) of a maximum of 5.0 inch-pounds.

3. A pair of flexible covering sheets, each having front and back surfaces and head and butt areas, a patch of cementing material connecting said sheets together in back-to-back relationship at their butts, said material comprising a bituminous compound fracturable at normal ambient temperatures and having high wetting characteristics and high adhesive characteristics under solar radiation at normal temperatures, said compound having a ring and ball softening point of the order of 175° F. to 200° F. and a penetration at 115° F., 50 grams, 5 seconds, in the range of 5–20, said compound being capable of adhering firmly both to covering sheet surface areas exhibiting the same compound and to surface areas exhibiting a different substance, whereby said sheets are held securely together as a pair but are readily separable by fracture of said compound to present bright, clean adhesive surfaces on each sheet for sealing the sheets together, front surface to back surface, in the adhesive bearing areas.

4. A pair of flexible covering sheets, each having front and back surfaces and butt and head edges, said sheets being arranged back-to-back, head-to-head, and butt-to-butt, with their butt and head edges substantially in register, and means connecting the sheets together adjacent their butt edges as thus arranged, said means comprising a bituminous compound fracturable at normal ambient temperatures and having high wetting characteristics and high adhesive characteristics under solar radiation at normal temperatures, said compound having a ring and ball softening point of the order of 175° F. to 200° F. and a penetration at 115° F., 50 grams, 5 seconds, in the range of 5–20.

5. The invention as defined in claim 4, in which said means comprises a patch of said compound.

6. The invention as defined in claim 4, in which said means comprises a lane of said compound.

7. The invention as defined in claim 4, said compound further having a viscosity, Saybolt Furol at 350° F. of 100–250 seconds and an impact resistance (impact test —¼'' x 3'' diameter disc single blow at 115° F.) of a maximum of 5.0 inch-pounds.

8. The invention as defined in claim 7, in which said means comprises a lane of said compound.

9. A pair of prepared asphaltic exterior covering sheets each having front and back surfaces and arranged with one of said surfaces of one sheet facing a corresponding one of said surfaces of the other sheet, and fracturable means connecting the sheets together, said fracturable means comprising a bituminous compound fracturable at normal temperatures and having high wetting characteristics and high adhesive characteristics under solar radiation at normal temperatures, said compound having a ring and ball softening point of the order of 175° F. to 200° F. and a penetration at 115° F., 50 grams, 5 seconds, in the range of 5–20, said compound being capable of adhering firmly to either of said surfaces exhibiting the same compound or exhibiting a different substance and capable of splitting substantially medially when the sheets of a pair are separated by fracture of said compound, so that when laid with said compound against a surface, the compound will wet and adhere securely to the surface under solar radiation at normal temperatures.

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