No. 851,331. PATENTED APR. 23, 1907.

H. R. WARDELL.

COMPOUND ROOFING SHEET.

APPLICATION FILED JAN. 23, 1906.

FIG. I.

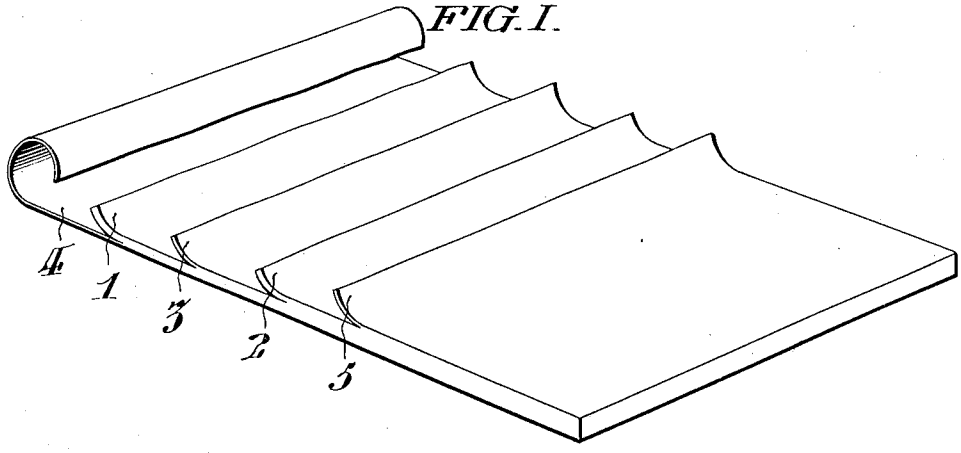


FIG. II.

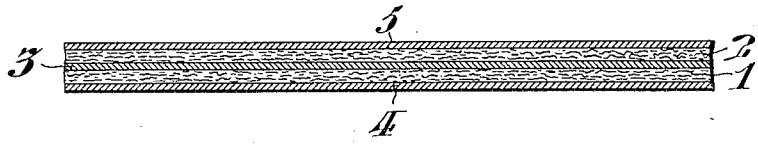


FIG. III.

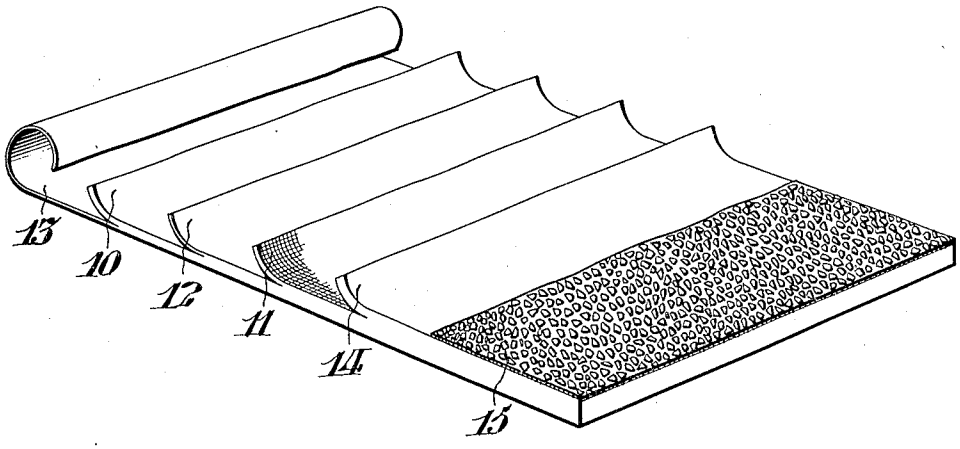
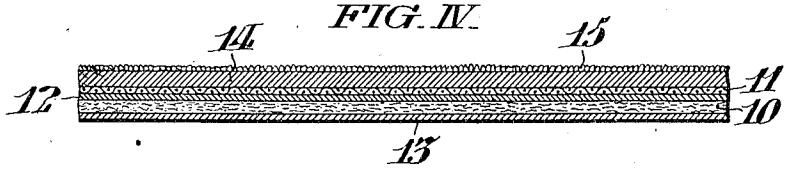


FIG. IV.



WITNESSES:

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UNITED STATES PATENT OFFICE.

HENRY R. WARDELL, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE BARBER ASPHALT PAVING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF WEST VIRGINIA.

COMPOUND ROOFING-SHEET.

No. 851,331. Specification of Letters Patent. Patented April 23, 1907.

Application filed January 23, 1906. Serial No. 297,418.

To all whom it may concern:

Be it known that I, HENRY R. WARDELL, residing at Hamilton Court, in the city and county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Compound Roofing-Sheets, of which the following is a specification, reference being had to the accompanying drawings.

My improvements relate to composite bituminous roofing sheets of which the basis consists of textile or felted organic fabric; in combination with bituminous layers which serve the double function of protecting and strengthening the fabric.

As heretofore manufactured, the basis of such sheets has usually consisted either of coarse paper or what is known as wool felt or other coarse felted material, saturated with a bituminous preservative solution, usually fluid solution of asphalt in oil, and in this respect my present invention does not differ from the prior art. It has also been heretofore customary to coat the surface of the fabric which forms the basis of the roofing sheet with a thick asphaltic solution, the purpose of which is both to protect and to strengthen the foundation fabric.

The protection of the fabric is two fold, first, to prevent rain or moisture from penetrating it, causing rotting or decay; and second, to prevent the sun or the atmosphere from effecting volatilization of the oily ingredients of the saturating compound which permeates the fabric. It will be understood that when in this specification, I speak of a "protecting layer", of bituminous compound, I refer to a layer devised expressly so as to effect this two fold protection. The strengthening effect of a bituminous layer so equally necessary, but entirely distinct from its protective character. In themselves, such fabrics as are used for roofing purposes, do not possess sufficient consistency.

Paper or felt is very easily torn and possesses little strength; burlap is tougher but is flimsy, being liable to be distorted by slight strains. A properly applied bituminous layer confers upon the fabric which forms the basis of the roofing, that stiffening and strengthening effect which is required to make it an effective roofing material, strong enough to withstand the ordinary strains and wear to which such material is subjected, without tearing or distortion.

Heretofore, no distinction has been made between the use of a bituminous layer to confer protection, and its use to confer strength; and accordingly, previous material of this character has been unsatisfactory in this respect. The difficulty relates to the proper consistency and composition to be given to the layer, and results from the impossibility of making a single substance properly perform these two functions; for, if an asphaltic layer be made of a sufficiently hard consistency to effectually exclude moisture and protect the enclosed oily constituents, it is too brittle to give to the sheet the desired strength; while on the other hand, if it be made soft enough to confer strength and toughness, it fails in its function of properly protecting the fabric. Recognizing these difficulties in the way of obtaining from one layer, or from several layers if they be of the same nature, the combined protective and strengthening effect which is desired, my invention consists in providing a roofing sheet with two or more layers having different characteristics, the outside layer or layers being specially designed for the purposes of protection, and the inside layer or layers being especially designed for the purpose of strengthening the sheet.

It is obvious that this invention is capable of variation in its application, and that it may be employed in connection with a great variety of compound bituminous roofing sheets. I will however, describe my invention as applied to certain forms of sheet which I consider desirable, by way of exemplification of the invention, with the understanding that my invention is not limited to the specific forms which I will now proceed to describe.

In the accompanying drawings, Figure I, shows in perspective, and Fig. II, in transverse section, a simple application of my invention to a compound sheet built up with two layers of a felted fabric such as wool felt. Figs. III, and IV, similarly show the application of my invention to a composite sheet of which both a felted fabric and a woven fabric such as burlap are used as the basis of the sheet, and in which the external protective asphaltic layer is made thicker on one side

than the other, and provided with a protecting layer of grit or sand as a safe guard against burning embers.

I will first describe my invention as embodied in the composite sheet shown in Figs. I, and II.

The basis of the sheet consists of the two layers, 1, and 2, of felted fabric. This may be any of the known forms of roofing paper or roofing felt, but I prefer to employ wool felt. This felt is thoroughly saturated by an asphaltic compound; the saturating compound is prepared by using a natural asphalt, or a mixture of two or more such natural asphalts, thoroughly fluxed by the addition of an oil, such as a petroleum residuum which is commercially known as maltha. Sufficient of the flux must be added to produce a compound which, at the comparatively high temperature at which the saturation takes place, approaches the fluidity of water, for only thus can complete saturation of the felted fabric be secured. This saturating compound adds to the strength of the felted fabric, which prior to saturation has little strength. It also tends to preserve the felted material; but it must also be understood that such a saturated fabric unless further protected, cannot long resist the destructive effects of moisture and the atmosphere, because of the rapid drying out of its oily constituents with the consequent elimination of both the strengthening and the protective effect of the saturating compound. In order therefore to make an effective composite roofing sheet it is necessary to combine these saturated fabrics with distinct layers of bituminous composition to afford additional protection and strength; and for this purpose, I prepare two different sorts of asphaltic compositions, one specially designed to afford protection, and the other especially designed to afford strength.

The strengthening layer is composed of an asphalt which for this purpose should preferably be chosen to contain a considerable proportion of mineral matter, such for example, as Trinidad asphalt, as the presence of a proper quantity of such mineral matter tends to increase the strength of the asphaltic layer. This asphalt is then fluxed by the addition of the proper quantity of an oil such as maltha, until a penetration is attained of preferably from 60 to 80 on the Bowen penetration machine at 78° Fahrenheit.

The protective layer is differently prepared. Instead of an asphalt containing mineral matter, there is used an asphalt as pure as possible, and one with a high melting and a low congealing point. This is fluxed, as with maltha, until it exhibits a penetration of preferably from 25 to 55° on the Bowen penetration machine at 78° Fahrenheit.

Between felt sheets 1, and 2, there is interposed a layer 3, of the strengthening asphalt composition, the preparation of which I have described. Upon both of the outer surfaces of the compound sheet thus formed, there are applied layers 4, and 5, of the protective asphaltic composition prepared as I have explained.

It will be understood that a roofing sheet thus built up has much greater durability than other previous forms. The outer layers of the asphalt composition are especially designed to thoroughly protect the softer interior parts, and are hard enough and resisting enough to effectually prevent the penetration of moisture from without or the volatilization of the preservative oils from within. On the other hand, in addition to the strength thus imparted to the fabrics which form the sheet, the intermediate layer 3, of the strengthening asphaltic composition, is peculiarly adapted to add strength and toughness to the composite sheet. For this layer, effectually protected as it is from the volatilizing effects of the atmosphere, is formed of an asphaltic composition which imparts great strength and which does not tend to become brittle.

It is obvious that, without departing from the spirit of my invention, more than two of the felt sheets may be employed, and in such case it is best to interpose a layer of the strengthening asphaltic composition between each of these felt sheets.

In Figs. III, and IV, I have shown a varying form of my invention in which instead of employing two felt sheets, there is substituted for one of said sheets, a sheet of burlap. In the drawings, 10, represents the felt sheet and 11, the sheet of burlap. Between these two layers there is interposed a layer 12, of a strengthening asphaltic composition prepared as I have already described. On the external surface of the composite sheet thus formed, there are applied layers of the protective asphaltic composition. Of these, the lower layer 13, which comes in contact with the boards of the roof which is to be protected, need not be applied very thickly; but the upper layer 14, is made much thicker, and for this purpose it is desirable to have the burlap overlie the felt because burlap will support a thicker layer of an asphaltic composition than will felt. To this upper layer there may be applied a coating of sand or grit 15, which tends to prevent the destructive effect of falling cinders or embers which, if they come in direct contact with the upper protective layer may melt it, and make a hole through which water may thereafter penetrate.

Having thus described my invention, I claim:—

1. A composite roofing sheet provided with layers of bituminous composition of

differing physical characteristics, including an external layer having high protective characteristics, and an internal layer having high strengthening characteristics, substantially as set forth.

2. A composite roofing sheet formed upon a basis of two or more organic fabrics saturated with a bituminous compound, and having interposed between them a layer of bituminous composition, having high strengthening characteristics, and having applied to the external surfaces of the composite sheet layers of bituminous composition having high protective characteristics, substantially as set forth.

3. A composite roofing sheet formed upon a basis of organic fabrics saturated with an asphaltic composition; having interposed between them an asphaltic layer of about the consistency described for strengthening purposes; and having applied to the external surface of the sheet an asphaltic layer of about the consistency described for protective purposes, substantially as set forth.

4. A composite roofing sheet formed upon a basis of two organic fabrics; a layer of bituminous composition, having high strengthening characteristics, interposed between said fabrics; and a layer of bituminous composition, having high protective characteristics, upon each of the outer faces of said fabrics, substantially as set forth.

In testimony whereof, I have hereunto signed my name, at Philadelphia, Pennsylvania, this 20th day of January 1906.

HENRY R. WARDELL.

Witnesses:—
JAMES H. BELL,
E. L. FULLERTON.