

UNITED STATES PATENT OFFICE.

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ROOFING MATERIAL.

1,026,855.

Specification of Letters Patent.

Patented May 21, 1912.

No Drawing.

Application filed May 7, 1909. Serial No. 494,697.

To all whom it may concern:

Be it known that I, CARLETON ELLIS, a citizen of the United States, residing at Larchmont, in the county of Westchester
5 and State of New York, have invented certain new and useful Improvements in Roofing Materials, of which the following is a specification.

This invention relates to roofing materials; and it comprises a fiber reinforced roofing material containing fluent non-phenolic bituminous bodies containing minimal amounts of a dissolved fungotoxic metal compound inert as respects the fiber
10 employed; all as more fully hereinafter set forth, and as claimed.

Roofing felts and papers consist of one or more plies of fabric material, which may be paper or felt or both carrying an impregnating body of bituminous material. In the cheaper grades this impregnating composition usually has an asphalt base, such as Trinidad asphalt thinned with petroleum residuum or asphalt oil. The thinned composition may or may not be boiled. Higher grades are made with candle tar, stearin pitch, Calabria pitch, gilsonite, uintaite, Egyptian asphalt, etc., thinned in some way and preferably boiled. As many plies of fabric impregnated with these compositions
20 as may be desired are assembled and the outer ply may then be coated or surfaced with a similar mixture with or without mineral fillers. Usually the surfacing composition is previously boiled with air blown through it, in order to get a composition which does not oxidize readily on exposure. With oxidation the physical character of the material changes considerably and it is
30 of course desirable to produce all the oxidation preliminarily and then adjust the fluency of the composition. The mineral filler may be sand, gravel, asbestos, etc. The surface is sometimes treated with talc or dusted or coated with short fibered asbestos to give fire resistant qualities. Other types of roofing are composed of a couple of layers of felt and paper with an intermediate layer of the bituminous composition. These roofing compositions in use are exposed to extreme climatic conditions and are not long lived. In practice it is found necessary frequently to repaint every three years or so. The fiber impregnation is
40 necessary to hold the bituminous composi-

tion in place and give it form and some degree of structural strength. Unfortunately, however, since these bituminous compositions do not adhere to fiber as thoroughly as they should and as on exposure to air they are apt to oxidize somewhat, they are usually avenues for moisture to gain access to the fiber. Also moisture is apt to penetrate between the plies or between the undermost surface of the roofing material and the roof. In the presence of this moisture various fungoidal organisms are apt to grow and injure or destroy the fiber and with the fiber the strength of the roofing as a whole. In compositions of the type of those described there is nothing actively toxic either to bacteria or to the higher fungi of the type of the dry rot organism. Occasionally tar, and pitch, from destructive distillation, creosote residuum, and like bodies containing phenoidal bodies are added to the composition. These, while toxic to bacteria, are not particularly toxic to the more highly organized non-bacterial fungi, such as molds, etc., and for this purpose they have the great disadvantage that in time they tend to "tender" or weaken the fiber. The phenols are very reactive bodies and have an affinity for fibers both vegetable and animal. In time therefore they tend to weaken these fibers by destroying their original character.

I have discovered that roofing fabrics of the kind described may be made much longer lived and of a better character generally by dissolving in the bituminous composition used in lieu of phenolic preservatives a minimal amount of a metal composition having active toxic properties for the fungi, the organisms which are chiefly concerned in the deterioration of roofing fabrics in use. While compounds of other metals, such as zinc may be used, I prefer compounds of copper. Very few compounds of copper and zinc are soluble in bituminous bodies of this nature, but the compounds with tarry, fatty and phenolic acids may be so dissolved. Copper compounds, and to a less degree zinc compounds, are actively toxic toward the higher fungi, but the salts with mineral or ordinary organic acids cannot be used for this purpose since they are all more or less soluble in water so that they would wash out in time. But by using salts with a tarry, oily, resinous or phenolic acid,
50 60 65 70 75 80 85 90 95 100 105 110

this water solubility disappears and where the salt is contained in solution in the bituminous impregnating composition itself, the copper will remain indefinitely. Salts of copper and the like with phenolic acids are of course not acid in nature and do not have the described "tendering" effect on woody fiber.

In effect, the roofing material of the present invention may be considered to be a layeriform mass of bituminous material substantially free of free phenols, reinforced and rendered coherent by embedded organic fiber and containing a dissolved fungotoxic mineral salt as a protection to the reinforcing decomposable fiber against molds and the like.

Copper oleate, copper resinate, copper compounds of the naphthenic acids from petroleum refining, copper compounds of carbolic, cresylic, etc. acids, and other copper compounds derived from oily or resinous acids may be employed in the present invention. Mixtures of these compounds may also be used. A quarter of one per cent. of these copper compounds in the impregnating composition is ample for the present purpose. In the surfacing composition it is preferable to use somewhat more, even up to 1 or 2 per cent. In making a 2-ply roofing felt for example the fabric used may be impregnated with a mixture of 10 parts candle tar, 200 parts asphalt, which may be Trinidad, Venezuela or other form of commercial asphalt, 25 parts gilsonite, 200 parts of asphalt oil and 2 parts of copper oleate. This is somewhat less than half a per cent. of the copper compound. The amount may be reduced to a quarter of a per cent. or less if desired, even for roofing fabrics which are to be used in tolerably exposed situations. In lieu of the copper oleate a similar amount of resinate, naphthenate, carbolate, etc., may be employed. These copper compounds may be readily made by heating oxid of copper in the requisite amount with the acid body. The described composition if desired may be boiled. After assembling the impregnated plies of felt the surface may be given a treatment with a mixture of 30 parts candle tar, 40 parts gilsonite, 50 parts asphalt oil and 2 parts of one of the described copper compounds. If desired the mixture may be afterward treated with talc to give a good feel or it may be dusted or coated with short fibered asbestos to make it fire resistant. For many purposes soft paraffin wax, crude wax, or waxtailings may be incorporated in the composition in any desired proportion. Where the composition is too thick for application any kind of thinning oil, such as petroleum oils, may be employed. It is in general desirable to avoid the use of tars, pitches, creosote oils, etc. containing substantial amounts of free phe-

nols for the stated reason that they are apt to tender the reinforcing fiber.

Where a white roofing is desired it may be made by applying a layer of asbestos paper to the described roofing. This asbestos paper may not be impregnated at all but it is desirable that it should be. It may be impregnated with a mixture of rosin and paraffin oil with the addition of some whitening, barytes, lead sulfate, zinc sulfid, etc. The asbestos not being susceptible to the action of bacteria or fungicidal compositions the use of a copper compound in this layer is not necessary. The asbestos may also be impregnated with other mixtures, such as a mixture of gum thus (crude turpentine) and mineral oil.

In making compound roofing fabrics under this invention, two layers of felt or paper impregnated with a bituminous composition containing dissolved fungotoxic metallic salts may of course be spaced and united by a layer of a bituminous composition, which may contain mineral fillers. Vegetable fiber being absent from this intermediate layer there is no great necessity for dissolving copper therein. But the bituminous composition used for impregnating the fiber should contain the dissolved copper. Where an external facing layer of bituminous composition is used, it is in general desirable that it contain the dissolved fungotoxic body since the lower layer comes in contact with the fiber and moisture is apt to creep through it or between it and the lower layers. This outer layer of bituminous composition may of course contain any desired amount of mineral filler, such as sand, gravel, rock dust, etc. Using the dissolved copper in the impregnating composition the fibers are rendered much less susceptible to action by bacterial and fungoid organisms. In addition, the copper tends to produce a distinct advantage in the character of the bituminous composition rendering it less permeable to moisture and retarding oxidation phenomena. Perhaps the increased impermeability is connected with this resistance to oxidation. With roofing material of this nature the necessity for repainting oftener than 5 or more years disappears and with heavily copperized impregnations up to 3 or 4 per cent. of dissolved copper compound, there is no necessity whatever for repainting.

Artificial asphalts, such as those derived in distilling petroleum having an asphalt base, such as Oklahoma petroleum, Texas petroleum, California petroleum, etc., may be used in lieu of the described natural asphalts. In producing these asphalts it is useful to oxidize by blowing air through them. Treating asphalt by heating with sulfur is less useful. These asphalt residuums for the present purposes have the advan-

tage that they harden superficially somewhat on exposure to air thereby making a particularly good roofing material.

I prefer the copper compounds stated, to the zinc compounds which however may be used. Chlorids, bromids, iodids, sulfocyanids, etc., of arsenic or antimony may be employed as these compounds are soluble in oily solvents but their action upon the higher fungi is not as good as that of copper though their activity in restraining the growth of the lower fungicidal organisms, such as bacteria, is somewhat better. They may of course be used in conjunction with the copper compounds.

In impregnating the fabric the desired composition may be simply heated until freely liquid and the fabric dipped or otherwise treated in the usual way. Or the hot fluent composition may be painted upon the fabric. It is a useful precaution to paint the roof to which the paper is to be applied with a similar composition rendered liquid by heat. In this application, however, I do not claim the impregnation of the wood with compositions of this nature, that forming the subject-matter of another and copending application Ser. No. 474,565, filed Jan. 27, 1909. For convenience in manipulation it is usually desirable to dissolve the copper compound or other fungotoxic salt in the thinner of the various oily bodies used in the composition. For instance, in the specific composition stated above the copper compound may be dissolved in the asphalt oil and this solution subsequently mixed with the more viscous portions of the composition. Or the total amount of the fungotoxic salt may be dissolved in a portion of the thinning oil

and then subsequently admixed with the rest of the composition. It is convenient in practice to produce a tolerably concentrated solution of the fungotoxic salt in thinning oil and then use as many gallons of this solution as may be necessary to produce the desired amount of dissolved copper in the resultant composition.

What I claim is:—

1. As a roofing material a plurality of layers of bituminous composition, each such layer containing a reinforcing fabric and holding a dissolved fungotoxic mineral salt, the proportion of such dissolved mineral salt being greater in an outer layer.

2. As a roofing material a plurality of layers of a bituminous composition containing reinforcing fabric and holding a dissolved fungotoxic copper salt, the proportion of such dissolved fungotoxic copper salt being greater in an outer layer.

3. A roofing material comprising a plurality of layers of asphalt-like material holding a dissolved fungotoxic salt, each such layer being reinforced with fabric and the proportion of such dissolved fungotoxic salt being greater in an outer layer.

4. A roofing material comprising a plurality of layers of asphalt-like material holding a dissolved copper salt, each such layer being reinforced with fabric and the proportion of such dissolved copper salt being greater in an outer layer.

In testimony whereof, I affix my signature in the presence of witnesses.

CARLETON ELLIS.

Witnesses:

NATHANIEL L. FOSTER,
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