June 3, 1941. J. H. YOUNG ET AL 2,244,352

PROTECTED METAL ARTICLE AND METHOD OF MAKING THE SAME

Filed July 6, 1938

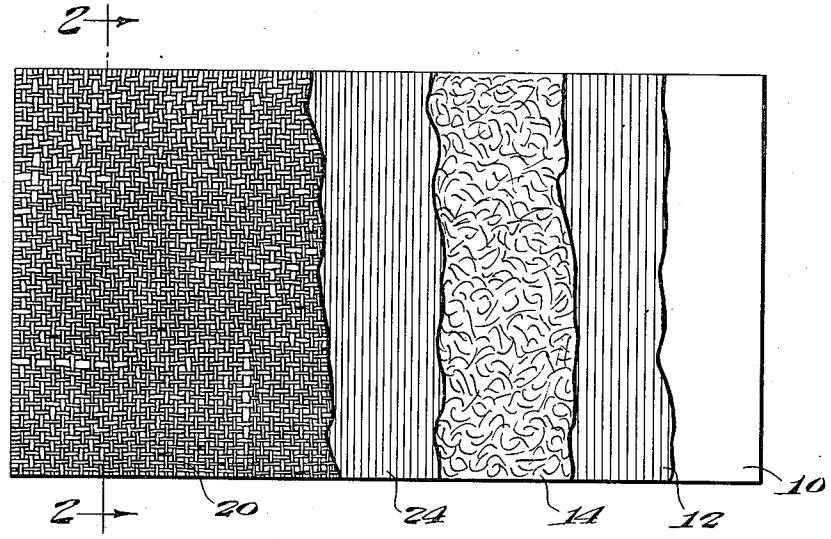



Fig. 1

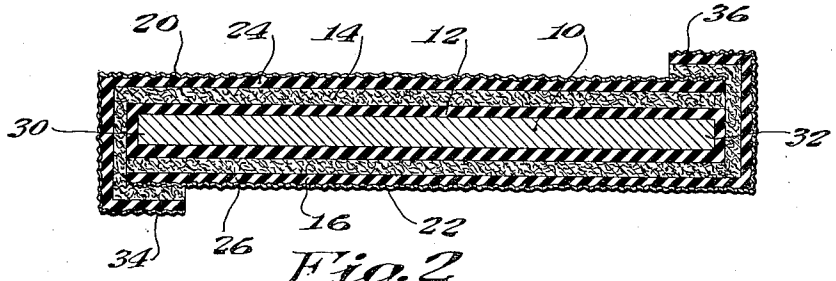



Fig. 2

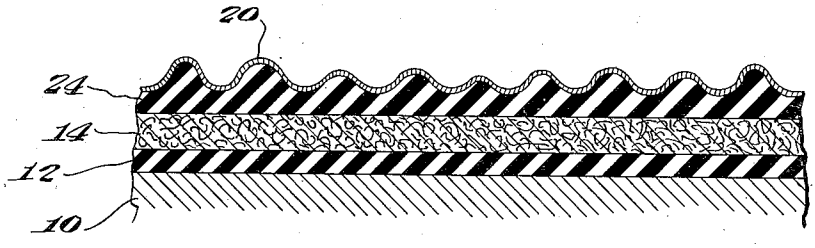



Fig. 3

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Patented June 3, 1941 2,244,352

# UNITED STATES PATENT OFFICE

2,244,352

## PROTECTED METAL ARTICLE AND METHOD OF MAKING THE SAME

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Application July 6, 1938, Serial No. 217,688

3 Claims. (Cl. 154—2)

This invention relates to an improved article of manufacture having an exterior metal surface which is affixed to a foundation or underlying member by a protective layer of asphalt or like bituminous material, and to the method of making the same.

In general the invention has for an object to produce a novel and improved article of the character specified, and more particularly to produce a novel and improved metal coated protected metal article, characterized particularly by an ability to withstand temperature changes during use with minimum tendency toward delamination, and which in addition possesses high weather resistance, increased resistance to destructive influence of sunlight, higher heat reflectivity, increased fire resistance, and presents a desirable textured surface appearance.

Another object of the invention is to provide a novel and highly efficient method of making a metal coated article of the character described, and more particularly to provide a novel method of making a metal coated protected metal article, and the improved method lends itself particularly to handling commercial forms of extremely thin metal foil, to the end that minimum wrinkles, abrasions and other irregularities and imperfections may be produced in the completed metal coated article.

With these general objects in view and such others as may hereinafter appear, the invention consists in the protected article, in the protected metal article, and in the method of making such article, hereinafter described and particularly defined in the claims at the end of this specification.

In the drawing illustrating the preferred embodiment of the invention, Fig. 1 is a development in plan of a building sheet embodying the invention; Fig. 2 is a cross-section on the line 2—2 of Fig. 1; and Fig. 3 is an enlarged detail illustrating the embossed form of metal foil used in producing the present building sheet.

In general, the present invention contemplates a new article of manufacture in which a foundation member either metallic or non-metallic and either rigid or flexible in nature is protected against the action of the weather by a coating of asphalt or similar bituminous material and by fibrous material preferably in sheet form, and preferably composed in whole or in part of asbestos. In its preferred form the invention is embodied in a building material in which a metal sheet is thus protected, and a building sheet of this general character is disclosed in U. S. Patent No. 1,277,755, dated September 3, 1918. In accordance with the present invention the protected metal article thus far described is further provided with an exterior protective surface of metal, preferably of a non-corrodible metal such as copper, aluminum, or the like, and in the manufacture of the metal coated protected article, the non-corrodible metal, preferably as a thin foil, is first embossed and then applied to and united with the fibrous material before the application of both to the asphaltic or similar bituminous coating, and the composite metal felt sheet is then applied to, and wrapped about at least two side edges of the foundation member to protect the same, and is folded upon and adhesively secured to the non-corrodible metal surfaces, as will be described.

In general, the present invention is embodied in a new article of manufacture comprising a foundation member protected against the action of the weather by asphalt or similar bituminous material applied to the foundation member, and also by fibrous material preferably in sheet form applied and adhesively affixed to the bituminous material. The foundation member may be of a metallic or non-metallic nature and may be rigid or flexible, and the fibrous material may and preferably will be composed in whole or in part of asbestos. In its preferred form the invention comprises a building sheet of the general character forming the subject matter of United States Letters Patent No. 1,277,755, of September 3, 1918, and upon which the invention is an improvement.

In accordance with the present invention, the protected metal article thus far described is further protected by an exterior layer of a non-corrodible metal such as copper, aluminum or the like, and this exterior protective metal member comprises preferably a thin foil which is first embossed in any usual or preferred manner and then secured to, and preferably adhesively affixed to, the fibrous material of the protected metal article before the application of the metal foil and fibrous material to the asphaltic or similar bituminous material of the protected metal article, producing a protected metal article in which the metal foil is firmly affixed to the fibrous layer with minimum wrinkles. In the preferred form of the invention in which the protected metal article comprises a building sheet, the composite sheet of foil-fibrous material is wrapped about the longer side edges of the protected metal sheet comprising the foundation member, and overlaps, and is adhesively affixed

to the metal foil on the opposite surfaces of the protected metal sheet with the fibrous layer interposed between two layers of foil and adhesively affixed to both, thereby producing a most efficient and durable protective envelope for the foundation member, as will be described.

Referring now to the drawing, in which the preferred embodiment of the invention is illustrated, 10 represents a metal sheet comprising preferably a steel sheet which is protected by an envelope 12 of asphalt or similar bituminous material. The asphaltic layer 12 is further protected by upper and lower fibrous layers or sheets 14, 16, preferably comprising saturated asbestos felt, which are adhesively affixed to the metal foundation member 10 by the asphaltic or bituminous layer 12 in such manner as to cover the surfaces of the asphaltic coated metal sheet 10 and to leave portions of the fibrous sheets 14, 16 projecting beyond the opposite marginal edges of the metal sheet 10, to be subsequently wrapped about the side edges of the sheet 10 to protect the same.

In order to most satisfactorily apply embossed non-corrodible metal foil layers 20, 22 to the fibrous layers 14, 16, I have found it desirable to first produce a composite foil-fibrous sheet by combining the layer of foil with the fibrous layer by means of an adhesive such as asphalt, and then to apply the composite foil-fibrous sheets to the asphaltic coated steel sheet 10 in accordance with the usual practice heretofore employed in the production of the protected metal article forming the subject matter of United States Letters Patent No. 1,277,755, above referred to. As illustrated, the foil layers 20, 22 are adhesively affixed to and combined with the fibrous layers 14, 16 by asphaltic layers 24, 26 prior to being applied to the metal sheet 10, and in order to protect the marginal portions of the metallic sheet 10, the composite foil-fibrous sheets are applied to the asphaltic layer 12 in such a manner that portions of the upper composite foil-fibrous sheet project beyond the one marginal edge 30 of the metal sheet 10, while portions of the lower composite foil-fibrous sheet are arranged to project beyond the second side edge 32 of the metal sheet 10. The marginal portions of the foil-fibrous layers are then wrapped about the side edges 30, 32 of the metal sheet and lapped upon the marginal portions of the upper and lower foil members 20, 22 of the protected metal sheet, with the fibrous layers of the overlapping portions of the composite sheets interposed between two layers of foil. By means of a suitable adhesive such as asphalt or other bituminous material, it has been found that a most satisfactory bond may be secured between the lapped portions 34, 36 of the composite foil-fibrous layer and the surface of the foil members 20, 22 producing a most durable structure of lap.

In practice, for economical reasons, it is desirable that the embossed foil be of extreme thinness, preferably in the neighborhood of from 4 to 5 thousandths of an inch, in thickness and it has been found by experience that the embossing of the foil is necessary in order to prevent the delamination of the foil and felt when the protected metal article is subjected to changing atmospheric conditions such as extreme changes in temperature. It has been found that the smooth foil coatings heretofore used in the production of commercial forms of protected metal articles of the character described, tend to separate from the underlying felt or fabric layers in the form of ridges and blisters. The separation is generally confined to those cases and at those points where the form of the sheet presents relatively large flat unbroken areas. The separation is due to the differences in the rates of heating and cooling and in the differences in the coefficients of thermal expansion of the foil and felt.

By embossing the metal foil, a surface area of the foil in relation to the area of the felt surface to which it is bonded is greatly increased and the effect is the production of "slack" in the foil at a multiplicity of points over its surface which dissipates stresses locally that would otherwise be transmitted and accumulated over large areas. In other words, the embossing prevents the foil from pulling in opposition to the felt layer as a tight and elastic membrane. In addition, the increased area of foil in contact with the adhesive layer results in a much stronger bond than it is possible to secure using a smooth foil and this contributes to the durability and utility of the improved protected metal article.

The texture appearance of the protected metal article resulting from the embossing not only adds to the appearance of the article, but, in addition, serves to effectively break up reflected light, relieving the otherwise bright metallic appearance of the sheet, and in reducing high lights, the embossing tends to hide surface markings and other irregularities which otherwise would stand out plainly on a smooth foil surface and detract, to some extent, from the appearance of the sheet.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. The method of making a protected metal article comprising embossing a thin non-corrodible metal foil, thereafter adhesively affixing the pre-embossed metal foil to a layer of fibrous material by means of a plastic adhesive to thereby form an adhesive layer having an undulating surface contacting and conforming to the pre-embossed foil and having a plane surface contacting the fibrous layer and thereafter adhesively affixing the fibrous layer of the assemblage thus formed to a metal sheet.

2. The process as defined in claim 1 in which a second assemblage of said foil-fibrous material is adhesively affixed to the opposite surface of said metal sheet by an asphalt adhesive.

3. A structural building element comprising a load supporting metal core, a pre-embossed laminated composite attached to the metal core and covering at least one of the surfaces and a side edge thereof, said composite comprising a layer of fibrous material in substantially planar form and a thin covering of non-corrodible metal foil, exhibiting an embossed exposed surface, adhesively affixed to said fibrous material by a layer of thermo-plastic adhesive having an undulated outer surface conforming to the undulations of said metal foil and adhesively adhering thereto throughout substantially its entire surface and having its inner surface adhering to substantially the entire surface of the fibrous material.

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