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J. H. YOUNG ET AL

1,973,193

PORTABLE PROTECTED METAL ARTICLE

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Fig. 1.

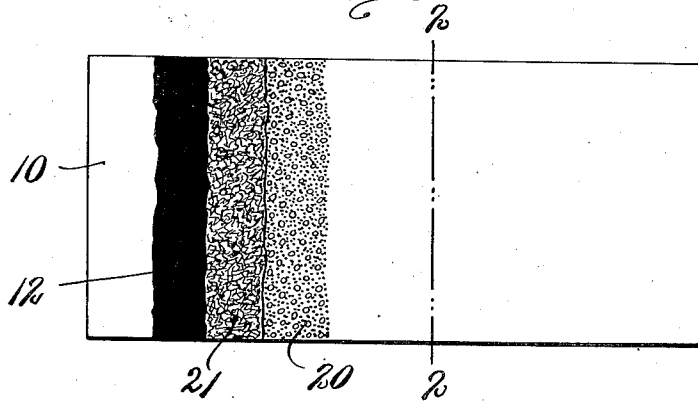


Fig. 2.

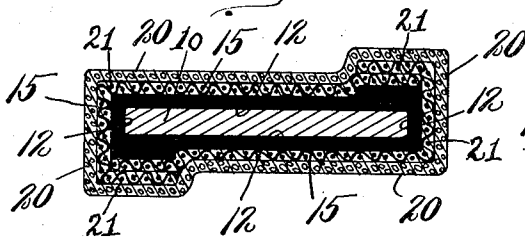


Fig. 3.

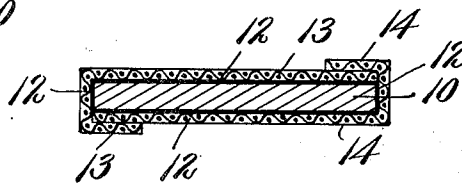


Fig. 4.

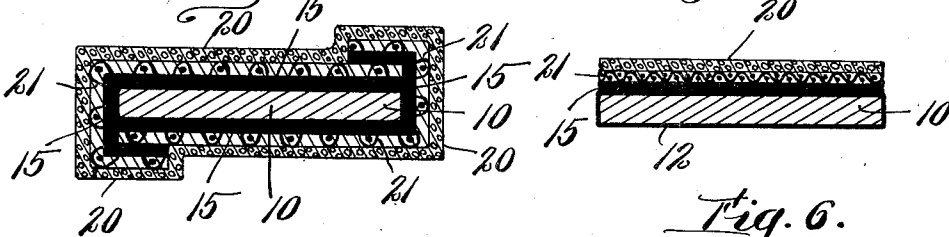
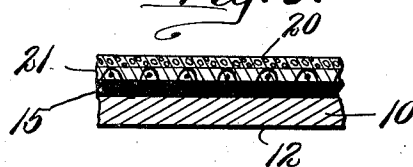


Fig. 5.



Inventor S.
James Howard Young
Dean S. Hubbell
by Jas. H. Churchill
Atty.

UNITED STATES PATENT OFFICE

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PORTABLE PROTECTED METAL ARTICLE

James Howard Young and Dean S. Hubbell,
Pittsburgh, Pa., assignors to H. H. Robertson
Company, Pittsburgh, Pa., a corporation of
Pennsylvania

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8 Claims. (Cl. 154—43)

This invention relates to a portable protected metal article and particularly to such an article for use as a building material and especially for the roof and side walls thereof.

5 The invention has for its object to provide a superior building material having a steel or other metal core member which is protected against corrosion and acid and alkali fumes by bituminous material, which latter is also protected against fire by non-combustible inorganic material which forms the exterior surface of the building material and is of such nature as will be described, that it may be white, or have imparted to it any other desired color.

15 A preferred construction of building material may be obtained by providing the steel or other metal member with a covering layer of asphalt or like bituminous material and applying to the asphalt layer a layer of inorganic fibrous felt, preferably of asbestos or like material, which is impregnated with asphalt, and then providing the felt or other inorganic fibrous layer, with a relatively thin covering layer of magnesia cement, which is normally white but which may be given any other desired color by the addition of the proper pigments or other coloring matter, and which, being non-combustible, affords durable fire protection for the asphalt, and increases the heat-insulating value of the protected metal sheet as a building material.

These and other features of this invention will be pointed out in the claims at the end of this specification.

Fig. 1 is a plan view of one construction of protected metal sheet embodying this invention, with parts broken away to illustrate the different protective layers;

Fig. 2, an enlarged cross section on the line 2—2, Fig. 1;

40 Figs. 3 and 4, sectional details to illustrate the construction of the protected metal sheet shown in Figs. 1 and 2;

Fig. 5, a cross section of a modified construction of protected metal sheet, and

45 Fig. 6, a detail in section to more clearly illustrate the construction of the protected metal sheet shown in Fig. 5.

Referring to Figs. 1 and 2, 10 represents a metal core member, preferably of steel, which will be hereinafter referred to as a steel sheet and which may be flat or corrugated.

50 The steel sheet 10 is provided on all its surfaces with a layer 12 of asphalt or like bituminous material and preferably an asphalt of relatively high melting point, which may be

applied to the metal sheet, by passing the latter through a bath of melted asphalt.

The layer 12 of asphalt serves to protect the steel sheet from corrosion and from acid and alkali fumes.

The asphalt layer 12 has applied to its layers 13, 14 of inorganic fibrous felt (see Fig. 3), preferably of asbestos or other like fibrous material, which felt layers are saturated with asphalt.

60 The inorganic felt layers 13, 14 are represented in Fig. 3 before being saturated with asphalt and in Fig. 2, the saturating asphalt is represented by the numeral 15.

70 The saturating asphalt 15 may and preferably will be an asphalt of lower melting point than the asphalt layer 12 and the inorganic fibrous layers 13, 14 saturated with the asphalt 15 are adhesively affixed to the asphalt-covered, steel sheet by the bonding of the saturating asphalt 15 with the asphalt layer 12.

75 In this manner the steel sheet is protected from corrosion and from acid and alkali fumes.

Asphalt is flammable, and the present invention has for its object to protect the asphalt from fire, and at the same time provide a highly efficient fire protection at a minimum cost and also one which can be of any desired color whereby a more artistic and pleasing appearance may be imparted to the protected metal sheet especially when used as a roofing or side wall material for buildings.

80 To this end, the metal sheet 10 protected against corrosion and acid and alkali fumes as described, is further protected against fire by a layer or envelop 20 of non-combustible, non-metallic material which is capable of being applied in a relatively thin layer free or substantially free from voids, and preferably such a material which may be white or of any desired color.

85 A material of such characteristics and suitable for use on an asphalt-protected metal sheet as the exterior surface thereof is a magnesia cement provided with a suitable aggregate and pigment or coloring matter and capable of being applied to the asphalt-protected metal sheet in a relatively thin layer, preferably by spraying the magnesia cement onto the asphalt-protected metal sheet.

90 The magnesia cement may be an oxychloride or an oxysulfate cement.

95 An oxychloride cement suitable for use as the fire-protective coating or layer may be composed of plastic magnesium oxide, magnesium chloride, suitable aggregates and pigments, with small

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amounts of disodium phosphate and magnesium sulfate.

One set of proportions for a suitable mixture may consist of

	Parts by weight
5 Plastic magnesia	15
Integral water proofer (preferably aluminum stearate)	2
10 Sillex (ground silica sand)	34
Sand	49
Magnesium sulfate	1.5

These materials are mixed dry and are then gauged with approximately 31% by weight of a 22° Baumé solution of magnesium chloride containing 1% of disodium phosphate based on the weight of the magnesium chloride.

A suitable mixture for a magnesium oxysulfate cement may be made as follows:—

	Parts by weight
25 Plastic magnesia	15
Integral water proofer (preferably aluminum stearate)	2
Sillex	34
Sand	49

are mixed dry and then gauged with a 31% Baumé solution of magnesium sulfate to which has been added ½% of citric acid or 1% of sodium citrate by weight of the magnesium sulfate.

The aggregates used should give a grading of particle sizes that produces the least voids. The upper limit of particle size will be determined by the appearance desired of the fire protective coating or layer. A suitable upper limit of sand is near 40 mesh.

In the case of the magnesium oxychloride cements, where expansion is common, sufficient magnesium sulfate should be added to reduce the expansion to the point where it is not harmful. No more should be added than is necessary to do this because of decrease in the strength of the cement where an excess of magnesium sulfate is used.

The mixes are preferably gauged to the consistency where they may be sprayed onto the asphalt-protected metal sheets with air spray guns. When the non-combustible cement coating is sprayed onto the inorganic felt covering impregnated with asphalt, it is preferred to roughen the surface of the felt before spraying.

This roughening may be accomplished with a wire brush or other suitable tool, which will expose the fiber ends and thereby effect a better bond with the non-combustible cement sprayed thereon.

A very efficient bonding of the non-combustible cement layer with the felt layer may be obtained by providing a layer of felt outside of the layer impregnated with asphalt, which outside layer of felt may be designated as the unsaturated layer, and may be a separate layer 21 as represented in Figs. 2 and 4, or it may be integral with the saturated layer as represented in Figs. 5 and 6.

When the unsaturated layer is integral with the asphalt-saturated layer as represented in Figs. 5 and 6, a felt layer of sufficient thickness is used, and the asphalt is applied to one surface thereof, which latter is applied to the asphalt-coated metal sheet, and when thus applied, the upper portion of the felt layer which is not sat-

urated with asphalt, has the non-combustible cement applied to it.

It is preferred to first prime the upper portion 21 of the felt layer with a slurry of plastic magnesia and magnesium chloride solution and then spray thereon the non-combustible cement layer.

In this manner the asphalt will penetrate the felt layer from one side thereof and the magnesia cement will penetrate the felt layer from the other side thereof and will meet and bond with the saturating asphalt, and the felt layer will have a good asphalt binder for bonding with the asphalt on the metal sheet, and will also have a non-combustible inorganic cement coating firmly fixed in and to the felt layer and possessing more or less flexibility due to the said felt layer and to the particle size of the aggregate used in the magnesium cement.

When separate felt layers 13, 14 and 21 are used, the outside layer 21 may be affixed to the felt layer 13, 14 saturated with asphalt 15 and then primed with the magnesium slurry and sprayed with magnesia cement as above described.

From the above description and by reference to the drawing it will be observed that the steel sheet has its upper and lower surfaces and side edges enveloped in a layer of bituminous material which protects it against corrosion and acid and alkali fumes, and that said steel sheet is also enveloped in a non-combustible layer of non-metallic inorganic material, which is relatively light and thin and which can be white or of any other color, and which is firmly affixed to the bituminous material and covers the same with a layer of non-combustible inorganic and non-metallic material which is substantially free from voids and protects the bituminous material against fire.

As a result there is provided a highly efficient and relatively inexpensive building material, which is corrosion-proof and fire-proof and is capable of being given any desired color, and further when incorporated in the building is capable of having its non-combustible, non-metallic, inorganic layer renewed and maintained in effective condition at low cost by merely spraying the magnesia cement thereon.

Furthermore the improved building material may be given an artistic and pleasing appearance by imparting various surface effects in color to the non-combustible cement, which latter also cooperates with the inorganic felt layers to add materially to the heat-insulating value of the improved building material.

By the term "asphalt" as used in the claims it is desired to include not only asphalts but also bituminous materials of like nature.

While it may be desirable to employ the proportions herein described, it is not desired to limit the invention to the particular proportions specified.

The protected building material herein described is portable and can be shipped without sticking together as the non-combustible, inorganic, non-metallic layer constitutes an effective anti-stick and also serves to resist abrasion.

What is claimed is:

1. A portable bituminous protective metal article comprising a steel sheet, a coating of asphalt thereon, a felt layer adhesively affixed to said steel sheet by said asphalt coating, and a non-combustible layer of magnesia cement covering said felt layer and affixed thereto.

2. A portable bituminous protected metal article comprising a steel sheet, a coating of asphalt thereon, a layer of felt saturated with asphalt and adhesively affixed to said steel sheet by said asphalt coating, a second layer of felt unsaturated with asphalt and affixed to said saturated layer, and a layer of magnesia cement covering said unsaturated felt layer and affixed thereto.
3. A portable bituminous protected metal article having an enveloping layer of non-combustible, inorganic, non-metallic cement substantially free from voids and covering the bituminous material to protect the same against fire and capable of having imparted to it any desired color.
4. A portable bituminous protected metal article having an exterior surface layer of magnesia cement substantially free from voids and covering the bituminous material to protect the same against fire and capable of having imparted to it any desired color.
5. A portable bituminous protected metal article having an enveloping layer of non-combustible, inorganic, non-metallic cement provided with a relatively fine aggregate to form a fire-resisting and heat-insulating covering substantially free from voids for the bituminous material of said protected metal article.
6. Portable building material comprising a corrodible metal core member having a protective layer of felt impregnated with asphalt and covering the upper and lower surfaces and sides of said core member, and a non-combustible, non-metallic inorganic cement substantially free from voids covering said felt layer and affixed thereto to form a non-combustible covering therefor.
7. A portable bituminous protected metal article having an enveloping layer of fibrous material provided with asphalt partially penetrating into the fibrous layer from the surface thereof adjacent to the metal article and provided with a layer of non-combustible, inorganic, non-metallic cement partially extending into the fibrous layer from the outer surface thereof.
8. A portable bituminous protected metal article having an enveloping layer of fibrous material saturated with asphalt and affixed to the metal article, and a second layer of fibrous material unsaturated with asphalt and affixed to the saturated layer, and a layer of noncombustible inorganic, non-metallic cement penetrating into the second fibrous layer and forming on the outer surface thereof a thin non-combustible covering substantially free from voids.
- JAMES HOWARD YOUNG.
DEAN S. HUBBELL.