June 7, 1932. A. W. COFFMAN 1,862,332

PROTECTED METAL ARTICLE AND METHOD OF MAKING THE SAME

Filed March 3, 1931

Fig. 1.

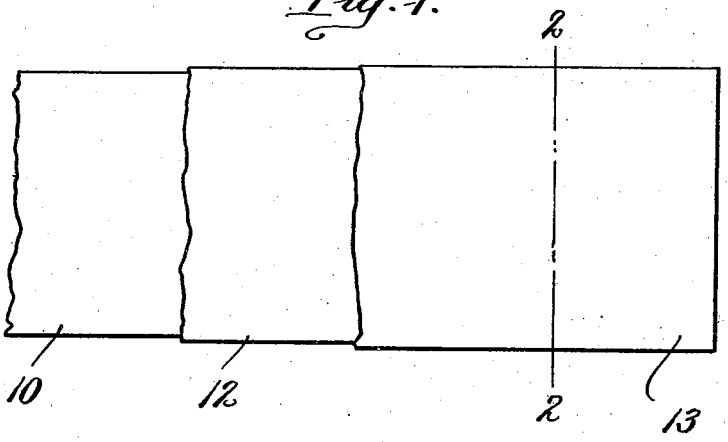
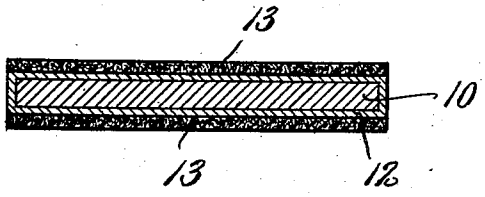


Fig. 2.



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Patented June 7, 1932 1,862,332

UNITED STATES PATENT OFFICE

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PROTECTED METAL ARTICLE AND METHOD OF MAKING THE SAME

Application filed March 3, 1931. Serial No. 519,803.

This invention relates to a protected metal article of that character in which a fibrous layer is adhesively affixed to a metal member, usually of steel or like corrodible metal.

The present invention has for its object to provide a protected metal article of the character referred to, which is capable of resisting relatively high temperatures and therefore capable of being used as a fire-resisting material for building purposes and also in other situations where it is exposed to heat.

The invention also has for its object to produce the improved protected metal article in a novel manner as will be described.

To these ends, the steel or other metal member has the layer of fibrous material, preferably asbestos felt, wool felt, or the like affixed to one and preferably both surfaces by a metallic adhesive, such as a layer of tin, zinc, lead, cadmium, or similar metal or alloy of metals having a lower melting point than the steel and capable of being rendered sufficiently fluid when heated to near its melting point to penetrate into and bond with the fibrous layer or layers, and thereby, when cooled, firmly affix the fibrous layer to the metal member to be protected.

The improved protected metal article may be produced by coating the metal article with a layer of the metallic adhesive, applying the felt or other fibrous layer to the coated article and subjecting both to pressure and heat sufficiently high to enable the metallic coating to become sufficiently fluid to enable it to penetrate into the fibrous layer under the influence of the pressure, after which the product thus treated is allowed to cool, whereupon it will be found that the felt or other fibrous layer is firmly bonded or affixed to the steel or other metal member to be protected.

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

Fig. 1 is a plan view of a protected metal sheet embodying this invention, with parts broken away, and

Fig. 2, a section of the protected metal sheet shown in Fig. 1 on an enlarged scale, the section being taken on the line 2—2.

Referring to the drawing, 10 represents the metal member to be protected, which member may be of steel or other metal and particularly of corrodible metal and is herein shown as a flat sheet, but which may be of other forms.

The metal member 10 will be hereinafter referred to as a steel sheet.

The steel sheet 10 is provided with a coating or layer 12 of a metal of lower-melting point and preferably of the so-called non-corrodible metals.

The steel sheet 10 may be coated with tin, zinc, lead, cadmium, bismuth or like metal or alloys of metals, and for simplification the coating metal will be hereinafter referred to as tin.

The coating or layer 12 of tin may be applied to the steel sheet 10 by dipping or passing the steel sheet into or through a bath of melted tin as now commonly practiced in the production of tin-coated steel sheets.

The tin-coated steel sheet in accordance with this invention is provided on one and preferably on both sides with a protective layer 13 of asbestos felt, wool felt, or other fibrous material.

The layer of fibrous material 13 will be hereinafter referred to as the felt layer, which is applied to the tin-coated metal sheet 10 and subjected to heat and pressure, said heat being sufficient to cause the tin coating to assume a mobile condition, so that under the influence of pressure it may be forced into the interstices of the felt, and when the tin coating is cooled, portions thereof will be interlocked or keyed with the fibers of the felt and the latter will be firmly affixed to the steel sheet by a non-flammable metallic adhesive.

The improved protected steel sheet may be produced by applying the felt layers to the steel sheet and mechanically clamping them together between suitable plates so as to effect intimate contact of the felt layers with the tin coating, and when thus assembled, placing them in an oven which is heated to a

temperature sufficiently high to render the tin coating fluid or substantially fluid. A temperature of 230° to 250° C. is sufficient to render the tin coating effective as a metal adhesive, which, when cooled, firmly affixes the felt layer to the steel sheet.

By the method above described, it will be observed that the felt layer is subjected to pressure before the tin coating is heated, but it is not desired to limit the invention to this method as the layers may be heated before the pressure is applied.

To this end, the felt layers are applied to the tin-coated steel sheet with the latter cold and without being subjected to pressure, but are merely properly positioned with relation to the tin-coated steel sheet, and the layers thus assembled are placed in an oven, which is heated to a temperature from 230° to 250° C. and when the tin coating is in an adhesive or substantially fluid condition, the assembled layers are removed from the oven and immediately passed through a set of cold rolls, which applies the pressure to the felt layers and also cools the tin coating.

It may and preferably will be preferred to employ this second method in the production of protected metal sheets in flat form as they may be more expeditiously produced than by the first method, but it is not desired to limit the invention to the particular methods disclosed of subjecting the layers of felt and tin to heat and pressure.

From the above description, it will be observed that the felt layers are affixed to the steel sheet or member by a metallic adhesive, which is ductile when cold and capable of being bent without cracking, is unaffected by atmospheric temperature changes, and has no objectionable coloring effect upon the exterior surface of the felt layers, so that when a felt layer of normally light or white color, such as asbestos felt, is used as the fibrous layer, the exterior surface of the protected metal sheet may be painted or have applied to it any desired color, either light or dark, and given any desired artistic appearance or design.

So also, the felt layer may have applied to or incorporated with it protective substances such as bitumens, resins, plastics, and the like to meet any condition of use.

The metallic adhesive being ductile enables the protected metal sheet to be bent or corrugated without cracking and exposure of the steel or other corrodible metal member.

It will further be observed that the improved protected metal article and especially the improved protected metal sheets having asbestos felt layers and employed for roofing and siding purposes in buildings afford superior protection against fire, as such sheets are non-flammable.

The improved metal article has been herein described as an improved protected metal sheet, but it is not desired to limit the invention in this respect, as the invention may be embodied in other forms of protected metal articles having a fibrous layer affixed to a metal member by a metallic adhesive.

What is claimed is:

1. An improved article of manufacture having a fibrous layer affixed to a metal member by an interposed metallic adhesive.

2. An improved article of manufacture having a felt layer affixed to a steel member by an interposed metallic adhesive which coats the metal member and penetrates into the felt layer.

3. An improved article of manufacture having a fibrous layer affixed to a corrodible metal member by a non-corrodible metal layer covering said metal member and penetrating into said fibrous layer.

4. An improved article of manufacture having a fibrous layer keyed to a metal layer covering a metal member of a higher-melting point.

5. An improved article of manufacture having a felt layer affixed to a steel sheet by an interposed layer of non-corrodible metal which covers said steel sheet and is keyed to said felt layer.

6. An improved article of manufacture having a fibrous layer affixed to a metal member by an interposed metallic layer of lower-melting point than said metal member.

7. The method of producing a protected metal article having a fibrous layer affixed to a metal member by an interposed metallic layer of lower-melting point than said metal member, which consists in applying the fibrous layer to the metal member covered with the metallic layer of lower melting point and subjecting the parts thus assembled to heat and pressure.

8. The method of producing a protected metal article having a fibrous layer affixed to a metal member by an interposed metallic layer of lower-melting point than said metal member, which consists in pressing the fibrous layer against the metallic layer of lower-melting point while the latter is in a heated condition and substantially fluid, and then allowing the substantially fluid metal to cool.

In testimony whereof, I have signed my name to this specification.

ALDEN W. COFFMAN.