FIG. 1.

FIG. 2.

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TRIM MEMBERS AND PRODUCTION THEREOF

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TRIM MEMBERS AND PRODUCTION THEREOF


Abstract

The present invention relates to stainless steel composites in the form of trim members and to a method for producing them and more particularly to conversion-coated, aluminum-striped stainless steel composites in the form of trim members and to a method for producing them. The present invention relates to conversion-coated, aluminum-striped stainless steel composites suitable for fabrication into trim members and to assemblies comprising of conversion-coated, aluminum-striped stainless steel trim members in combination with body members.

Stainless steel is known to serve a particularly good purpose in those applications where brightness and stain resistance to a variety of contaminants is required and is ideally suited for use as automotive trim. However, since most automotive bodies are constructed of carbon steel, the use of stainless steel can result in galvanic corrosion. Carbon steel is anodic to stainless steel and generally corrodes in the vicinity of stainless steel in the presence of an electrolyte, such as moisture.

To protect carbon steel it has been the practice to coat stainless strips with a non-ferrous sacrificial metal which is anodic to mild carbon steel prior to or after forming the strips into trim members. The coating is preferably aluminum. It is applied to those sections of the strip which will eventually contact the automotive body, i.e., the return flange of the fabricated trim member.

Testing under normal road conditions has indicated that the use of aluminum solves the galvanic corrosion problem faced by automotive manufacturers. However, when the aluminum corrodes, it results in the formation and bleeding of aesthetically objectionable aluminum corrosion products (white corrosion products).

I have discovered that the formation and bleeding of aluminum corrosion products can be minimized without adversely affecting the galvanic protection provided by the aluminum, through application of a protective chromate or phosphate conversion coating to the aluminum. These coatings have been applied in non-related environments to aluminum for protection against general corrosion and to very thin layers of zinc, for protection against galvanic corrosion. My work has shown that they offer protection against aluminum galvanic corrosion without detrimentally affecting the galvanic protection which aluminum provides for carbon steel in the vicinity of stainless steel.

It is accordingly an object of this invention to provide a conversion-coated, aluminum-striped stainless steel composite.

It is another object of this invention to provide a method for producing a conversion-coated, aluminum-striped stainless steel trim member.

It is a further object of this invention to provide an assembly comprising of a body member in combination with a conversion-coated, aluminum-striped stainless steel trim member which provides galvanic protection for the body member.

The foregoing and other objects of the invention will be best understood from the following description, reference being had to the accompanying drawings, wherein:

FIG. 1 is a sectional view of a stainless steel trim member; and
FIG. 2 is a perspective view of a stainless steel trim member.

The present invention encompasses a composite suitable for fabrication into a stainless steel trim member, a composite in the form of a stainless steel trim member, a method for producing stainless steel trim members and an assembly comprising a stainless steel trim member in combination with a body member. The body member is comprised of metal, e.g., plain carbon steel, which is less noble in the electromotive series than stainless steel. In the context of this application, the term metal is interpreted as including metal which is painted and coated as well as bare.

The stainless steel trim member has a contact surface and an exposure surface. The contact surface abuts the body member after assembly and the exposure surface is subject to view. Adhered to the contact surface is a layer of aluminum. The aluminum is generally at least 0.5 of a mil thick and preferably between 3 and 5 mils. Covering the aluminum is a conversion coating from the group consisting of chromate and phosphate conversion coatings.

FIGS. 1 and 2 are respectively a sectional and perspective view of a stainless steel trim member which meets the requirements of this invention. It comprises an exposed surface, contact surfaces, aluminum strips, and conversion coatings.

The method of this invention includes the steps of shaping a stainless steel sheet into a trim member having an exposed surface and at least one contact surface and adhering aluminum to those portions of the sheet which are the contact surfaces of the finally formed trim member. Any of the well-known methods of shaping, e.g., roll forming, and adhering, e.g., roll pressure bonding, are within the scope of this invention. The method additionally involves the step of applying a conversion coating to the aluminum either before or after shaping. It can be any of the well-known chromate or phosphate conversion coatings. A typical chromate conversion coating consists of 0.99 ounce of sodium dichromate, 0.132 ounce of sodium fluoride, 0.66 ounce of potassium ferriycianide, 3 cubic centimeters of nitric acid, and 1 gallon of water. It is applied at a temperature between ambient and 130 F. for a period of time between 5 seconds and 8 minutes. A typical phosphate conversion coating consists of 1 gallon of water and 10 to 20 ounces of solution composed of 61.7% ammonium phosphate, 22.9% ammonium fluoride, and 15.4% potassium dichromate. It is applied at a temperature...
ture between 110 and 120° F. for a period of time between one and five minutes.

The following example illustrates several aspects of the invention.

A number of stainless steel trim members were prepared with stripes of aluminum adhered to their contact surface. Half of the trim members were assembled onto carbon steel body members without further treatment. The other half were given a chromate conversion coating prior to assembly. Coating was accomplished by dipping the aluminum stripes into a bath maintained at ambient temperature. Immersion times ranged from 1 to 3 minutes. The bath contained Iridite No. 14-2, a chromate conversion coating sold by Allied Research Products, Inc., Baltimore, Md.

All of the assemblies, i.e., those with and those without chromate conversion coatings, were subject to salt spray tests in order to demonstrate the effectiveness of the conversion coatings. These tests are considered to be accelerated tests as far as they produce corrosive conditions far more severe than those encountered by automotive bodies under normal road conditions. Aluminum corrosion products were well in evidence on the untreated assemblies, i.e., those without chromate conversion coatings, after 24 hours of testing. The treated assemblies, i.e., those with chromate conversion coatings, were essentially free of aluminum corrosion products after 80 hours of testing and provided the carbon steel body member with galvanic protection equivalent to that provided by the untreated assemblies.

It will be apparent to those skilled in the art that the novel principles of the invention disclosed herein in connection with specific examples thereof will suggest various other modifications and applications of the same. It is accordingly desired that in construing the breadth of the appended claims they shall not be limited to the specific examples of the invention described herein.

I claim:

1. In the method of producing a stainless steel trim member, wherein a stainless steel strip is shaped into a trim member having an exposed surface and at least one contact surface and wherein an aluminum layer having a thickness in excess of 0.5 of a mil is adhered to portions of said stainless steel which become contact surfaces of the finally shaped trim member, the improvement which comprises: applying a conversion coating from the group consisting of chromate and phosphate conversion coatings onto the aluminum.

2. A method according to claim 1 wherein said conversion coating is a chromate conversion coating.

3. A method according to claim 1 wherein said conversion coating is a phosphate conversion coating.

4. A method according to claim 1 wherein said aluminum has a thickness of from about 3 mils to about 5 mils.

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