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PROCESS FOR PLATING METALLIC MATERIALS

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It is known to produce plated semi-finished products by laying a core material and a plating material one above the other, heating the two together and rolling out at the same temperature. During the rolling process, the plating layer becomes welded to the core material during the first few passes, so that during subsequent passes, the plated material behaves as a homogeneous material under the roller. When this method is used, however, considerable difficulties are encountered as soon as attempts are made to apply a plating layer to a material which has the same or substantially the same resistance to deformation as the core material at the rolling temperature used. For example, while it is readily possible for a relatively hard core material to be welded fast to a softer plating material in the first or second pass when using a uniform rolling temperature, it is not possible to plate material by the rolling process if the core material has the same resistance to deformation as the plating material, that is to say if both materials have the same degree of softness at the rolling temperature used. It is immaterial if the two materials have either a low or a high resistance to deformation at the rolling temperature used. For example, in connection with light metals, it is readily possible for a relatively hard core material, for example an Al-Cu-Mg alloy, to be united to form a plated material with a very soft plating material, such as pure aluminum, by using a rolling process with a uniform rolling temperature of 440° C. On the other hand, it is not possible for a lightly alloyed core material, for example a low Al-Mg-Si alloy to be plated with pure aluminum as the plating material, or for normal industrial aluminum to be plated with ultra-pure aluminum, by the rolling method. In the latter case, it is immaterial what temperature is used for the rolling operation. The reason for this different behavior is perhaps to be found in the fact that in the first case, namely when using the Al-Cu-Mg alloy and a pure aluminum, the materials have a different resistance to deformation at the same temperature so that relative movement between the plating material and core material takes place during the rolling. In the second case, on the contrary, in which the Al-Mg-Si alloys and the pure aluminum, or the industrial aluminum and the ultra-pure aluminum, have substantially the same resistance to deformation at the same temperature, this relative movement does not occur. Due to the friction which is set up by the relative movement, it is obvious that atomic forces are set up, so that a satisfactory welding is possible in the first case, while the welding operation is a failure in the second case.

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It has now been found that metallic materials can be satisfactorily plated with a metallic plating material having the same or substantially the same resistance to deformation if the core material and the plating material are welded to one another in a condition in which both materials have different resistances to deformation. If the core material and plating material are rolled on to one another in such a condition, it is to be observed that the plating is satisfactory after the first few passes. Since the resistances to deformation are dependent on temperature, the differentiation in the resistances to deformation can be produced by the two materials being rolled on to one another at different initial temperatures.

Example 1

An aluminum alloy containing 0.8 percent Mg, 0.8 percent Si, and 0.3 percent Mn, which is to be used as core material, is heated to a temperature in the region of 250–370° C., preferably 300–350° C. Just prior to the rolling operation, a plating material consisting of a plate of pure aluminum (98%–99.8%) which is heated to about 400–600° C., preferably 550° C., is laid on the core material and the two materials are rolled together. A satisfactory plating is produced.

Example 2

Industrial aluminum (about 99%) to be used as a core material is heated to about 250–375° C., preferably 300–350° C. A plate of ultra-pure aluminum (aluminum content: more than 99.9%) heated to about 400–650° C., preferably 550° C., is laid on the said core material and the two materials are jointly rolled. The two materials become completely welded to one another at the place of contact.

We claim:

1. A process for plating metallic materials with a metallic covering material having at least substantially the same resistance to deformation, by heating and rolling, wherein the core material and the plating material are rolled in a condition in which they have different resistances to deformation.

2. A plating process as claimed in claim 1, wherein the core and covering materials are heated separately from one another and have different temperatures during the rolling operation.

3. A plating process as claimed in claim 1, wherein a low-alloy aluminum alloy at a temperature of about 250–375° C. is plated with pure aluminum at a temperature of about 400–650° C.

4. A plating process as claimed in claim 1, wherein industrial aluminum at a temperature of about 250–375° C. is plated with ultra-pure aluminum at a temperature of about 400–650° C.

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