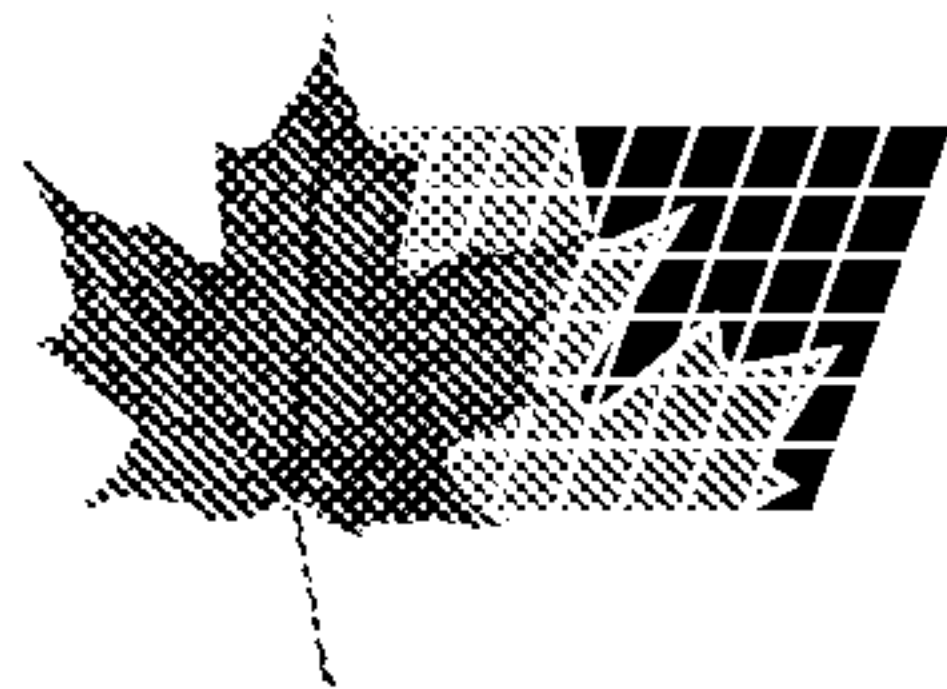




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(54) **METHODE DE TRAITEMENT SUPERFICIEL D'UN METAU**

(54) **METHOD FOR SURFACE TREATMENT OF A METALLIC
MATERIAL**

(57) The present invention relates to a method for creating an artificial patina on the surface of a copper-bearing material using a patination agent applied to the surface of the material after it has been installed in a final location of use. The precipitate of the patination agent is filtered and washed, and its content in the patination agent is adjusted within the range of 15 to 50% by weight of the patination agent after filtering. The patination agent is stored at a temperature below 5 °C until it is used.

ABSTRACT

The present invention relates to a method for creating an artificial patina on the surface of a copper-bearing material using a patination agent applied to the surface of the material after it has been installed in a final location of use. The precipitate of the patination agent is filtered and washed, and its content in the patination agent is adjusted within the range of 15 to 50% by weight of the patination agent after filtering. The patination agent is stored at a temperature below 5°C until it is used.

The present invention relates to a method for the surface treatment of a metallic material, and particularly to a method for treating a patination agent used for coating a copper-bearing material, to provide the patination agent with a long shelf life.

5 In natural patination, which takes place under ordinary weather conditions, copper forms, over a relatively long period of time, a surface coating or a protective layer, called patina. The patina may be for instance brown or green in color, and it is customary to divide patina into different types, brown or green patina. Among the factors affecting the creation rate of patina are
10 atmospheric conditions and the relative position of the copper surface with respect to wind direction and prevailing weather. Because natural patina as such is not harmful for the copper surface, but on the contrary forms a protective layer thereon, various different agents and methods have been developed for speeding up the creation of patina.

15 From Canadian Patent 734,897 there is known a method and agent for creating artificial patina. The agent according to Canadian Patent 734,897 is formed so that there is first mixed an aqueous solution of copper nitrate and iron (III) sulfate with an aqueous solution of sodium hydroxide, and then the created precipitate is separated from the mother liquor and further
20 washed with water in order to remove residual alkali. However, the patination agent according to Canadian Patent 734,897 must be used rapidly within a few days after preparation in order to create the desired artificial patina on a copper surface. Weather conditions are an obstacle for the use of this type of patination agent, because the patination must be carried out in conditions
25 essentially similar to those required for painting, i.e. in the open air, during dry and warm weather.

 When employing an artificial patination agent, it is advantageous to coat the desired copper surface indoors, for instance in the same premises where the copper was manufactured. However, when ready-patinated copper
30 plates are installed for example on building roofs, it is necessary to bend the plate or make fastening holes in the patinated surface, and fine patination agent particles may then be lost therefrom. From the point of view of the health of the

workers, working in the fine dust caused by the patination agent is not recommended, at least not without a respiratory mask. Moreover, damage to the patina surface during installation and other treatments results in preservation problems.

5 An object of the present invention is to overcome the deficiencies of the prior art and to provide a practical method for the surface treatment of a metallic material, by means of which method a patination agent having a long shelf life is applied to the desired metal surface, during advantageous weather conditions, after installation of the metal.

10 According to the present invention, a method for creating an artificial patina on the surface of a copper- bearing material after installing said material in its final location of use, comprising the steps of:

 (a) forming a precipitate by mixing an aqueous solution of at least one copper salt and an aqueous solution of an alkali metal hydroxide;

15 (b) filtering and washing the precipitate;

 (c) forming a patination agent by adding water to the precipitate to adjust the solids content to within the range of 15 to 50% by weight;

 (d) storing the patination agent obtained in step (c) at a temperature of 5 °C or lower prior to use;

20 (e) warming up the patination agent to the temperature of use; and

 (f) applying the patination agent on the surface of the copper- bearing material; wherein the surface is oxidized prior to the application of the patination agent.

25 The content of the precipitate in the patination agent of the present invention is advantageously adjusted within the range of 20 to 30% by weight of the patination agent after filtering. Further fine adjustment of the precipitate content may be carried out with the addition of water, to obtain a desired consistency of the patination agent for specific applications.

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Once prepared, the patination agent may be stored at a temperature within the range of 1 to 5°C, or frozen at a temperature range of -15 to -30°C. Preferably the patination agent is allowed to warm up to the temperature of use. In a preferred embodiment of the invention, the patination agent is applied to the
5 copper-bearing material after installing the material in its final location.

Artificial patination agents are well known in the art. A patination agent suitable for use as an aqueous coating solution in the present invention is disclosed in Canadian Patent 734,897.

When the desired copper plate to be patinated is installed in place, it can advantageously be subjected to artificial patination - in suitable weather conditions - with a patination agent processed according to the present invention, so that adhesion and preservation are ensured on the treated surface.

5 The adjustment of the precipitate content of the patination agent according to the invention is carried out by means of a washing stage advantageously simultaneous to capillary filtering. In capillary filtering, the patination agent is formed on a fine porous absorption surface, through which passes only the water or aqueous solution to be separated in filtering. Thus the
10 filtering stage and the washing stage can advantageously be performed in the same step. For adjusting the solids content, other known filtering methods can also be used, but then it is recommended to perform at least two successive filtering and washing steps.

 According to the invention, when the patination agent is put to use,
15 even after a long period of storage, the patination agent is first allowed to warm up to the temperature of use, after which water and/or sodium nitrate is added to the patination agent if necessary. Then the patination agent is subjected to mechanical agitation in order to achieve an essentially smooth patination sludge, and thereafter the patination agent is ready to be applied on the target surface.
20 Prior to application, the object to be patinated should be oxidized. This is carried out either by allowing the target surface to be oxidized naturally under the prevailing weather conditions, or by oxidizing the surface artificially, for instance with sodium chlorite. After applying the patination agent, the surface to be patinated is dried, and sodium silicate is advantageously sprayed thereon
25 in order to improve preservation, after which the surface is dried again. The application of the patination agent and the sodium silicate spraying are advantageously performed twice, but when desired, they can be performed several times.

 In the above, the invention is described with reference to one
30 coating material composition only, but it is naturally clear that the invention can

be applied to other corresponding coating material compositions within the scope of the appended claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A method for creating an artificial patina on the surface of a copper-bearing material after installing said material in its final location of use, comprising the steps of:

- (a) forming a precipitate by mixing an aqueous solution of at least one copper salt and an aqueous solution of an alkali metal hydroxide;
- (b) filtering and washing the precipitate;
- (c) forming a patination agent by adding water to the precipitate to adjust the solids content to within the range of 15 to 50% by weight;
- (d) storing the patination agent obtained in step (c) at a temperature of 5 °C or lower prior to use;
- (e) warming up the patination agent to the temperature of use; and
- (f) applying the patination agent on the surface of the copper-bearing material; wherein the surface is oxidized prior to the application of the patination agent.

2. A method according to claim 1, wherein the filtering and washing step is carried out by one-step capillary filtering.

3. A method according to claim 1, wherein water is added to adjust the solids content of the precipitate in the patination agent to within the range of 20 to 30%.

4. A method according to claim 1, 2 or 3, wherein the patination agent is stored at a temperature of 1 to 5 °C.

5. A method according to claim 1, 2 or 3, wherein the patination agent is stored in frozen condition at a temperature of -15 to -30 °C.

6. A method according to claim 1, 2 or 3, wherein prior to applying the patination agent to the copper-bearing material, water is added to the patination agent and it is turned into a sludge by means of mechanical agitation.

7. A method according to claim 1, 2 or 3, wherein prior to applying the patination agent to the copper-bearing material, sodium nitrate is added to the patination agent and it is turned into a sludge by means of mechanical agitation.

8. A method according to claim 1, 2 or 3, wherein the surface to be patinated is first oxidized, either naturally or by the application of sodium chlorite.

9. A method according to any one of claims 1 to 8, wherein after the surface has been patinated it is dried and coated with sodium silicate.

10. A method according to claim 9, wherein the surface is subjected, at least twice, to the steps of patination, drying, and coating with sodium silicate.