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PROCESS FOR THE BRONZING OF COPPER AND COPPER ALLOYS

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The present invention relates to processes for the bronzing of copper and copper alloys, more particularly brass and special brass (Sondernische).

The customary methods for coloring copper and copper alloys brown are based principally on two processes: According to the one process the metals are painted over or coated several times with suitable solutions, whilst according to the other process they are immersed in corresponding solutions. In both cases the metals must be subjected to a subsequent treatment with water and a scratch brush in order to obtain a uniform coloration and to impart the desired appearance to the surface. Even then there still remain darker and often black spots or patches, the elimination of which frequently amounts to an almost complete removal of the bronzing. Further disadvantages of the processes hitherto employed arise in metal constructions employed in connection with brickwork. In this case a bronzing operation in situ is impossible, inasmuch as by the application of the bronzing solution, the washing and the treatment with the scratch brush, the adjacent wood framework, brickwork and so forth would become soiled. Furthermore, if the parts have to be treated by immersion in the bronzing liquid, expensive vats are necessary for the immersion process, particularly when large metal constructional parts which cannot be divided or dismantled into small parts are to be bronzed.

The new process according to the present invention eliminates the aforesaid defects in a simple manner. The process is characterized in that the polished metal surface, which, if necessary, is freed from grease, is slightly corroded with small quantities of an acid solution consisting of water, hydrochloric acid and copper sulphate, is freed from the acid residues still adhering to it and is treated with a stream of gas containing ammonium sulphide in such manner that the stream of gas sweeps over the metal surface, whereby an immediate brown coloration is obtained.

A preferred constructional form of an apparatus suitable for carrying out the process according to the invention is illustrated by way of example in the accompanying drawing, in which:

Fig. 1 is a diagrammatic view of the general arrangement of the apparatus, and

Figs. 2, 3, 4, and 5 show diagrammatically various cross sections which may be employed for the nozzle hereinafter referred to.

The working operation of the process is as follows:

The polished metal surface 10 which, if necessary, is freed from grease, is rubbed down with a swab which is slightly moistened with the following acid solution:

Water ........................................... c.c. 1000
Concentrated hydrochloric acid ............. c.c. 20
Crystalline copper sulphate .................. grammes 20

This liquid causes, when applied to the metal, a slight corrosion of the surface. The slight coppering action which, in the case of brass alloys, arises at the same time acts favorably to the subsequent formation of copper sulphide. The small residues of acid still adhering to the metal after the application are then completely removed with a dry swab. Then the slightly corroded surface thus prepared is further treated by causing a stream of gas containing ammonium sulphide to sweep over it. The necessary stream of gas is produced by passing air supplied from a compressed air container 1 or a hand-blower 2 into an apparatus 4, 5, 7, 8 comprising a container operating in known manner, and through a solution of ammonium sulphide 5 of about 10-20% strength, whereby the air becomes saturated with the latter. The stream of gas 9 which is thus obtained and which contains ammonium sulphide is now directed to the metal surface 10 which is to be bronzed and which has been slightly corroded by means of the above-mentioned acid solution, in a uniform movement and with a distance of about 5-10 cm. between the metal surface 10 and the nozzle opening 8 of the bottle 4, 5, 7, 8. Even with only one treatment a beautiful bright brown is obtained. If the whole procedure (inclusive of the slight corrosion by means of the acid solution) is carried out several times, all color gradations up to deep dark brown can be produced according to the number of repetitions. Any spots or clouding which may arise are removed without trouble by lightly rubbing down with a polishing powder (for example Vienna chalk, etc.), or by lightly wiping over with the above-mentioned copper sulphate solution containing hydrochloric acid. Furthermore, it has been found that any iridescent blue tones which may arise disappear entirely on the subsequent coating of the metal with a protective lacquer, the color passing over into a pure brown.

The production of the stream of gas containing ammonium sulphide may be effected according to choice by means of compressed air 1 or a sim-
ple rubber hand-blower 2. Furthermore, the outlet nozzle 8 of the bottle 4, 5, 7, 8 may be adapted to all purposes of employment by the provision of suitable cross sections (round, oval, rectangular, slit-like and so forth—see Figs. 2, 3, 4, and 5). For actuating the blowing device other gases apart from air may also be employed so long as they do not cause any considerable decomposition of the ammonium sulphide.

The hereinbefore described new bronzing processes renders it possible to give a ter. 20 br. color to objects made of copper and copper alloys, and particularly brass and special brass in a quicker, simpler and cheaper manner than was hitherto possible. For this purpose no expensive vessels are necessary and the size of the work-pieces is not of importance. Moreover the work may be carried out either in the workshop or also in situ, for example, on building sites. The process likewise renders possible the renovation of bronzings which have become damaged, as also the subsequent coloring in brown of soldered parts. Any desired color tone between light and dark brown can be obtained in the simplest way.

I claim:

1. Process for the bronzing of copper and copper alloys, particularly brass and special brass, comprising in steps: polishing the metal surface to be bronzed; treating said metal surface so as to free it from grease; slightly corroding said metal surface by applying to it small quantities of an acid solution consisting of water, hydrochloric acid and copper sulphate and made up in the proportion of 1000 cc. water, 20 cc. concentrated hydrochloric acid and 20 grammes crystalline copper sulphate; removing acid residues adhering to said metal surface; and treating said metal surface with a stream of gas containing ammonium sulphide in such manner that the stream of gas sweeps over the said surface, whereby an immediate brown coloration is obtained. 25

2. Process for the bronzing of copper and copper alloys, particularly brass and special brass, comprising in steps: polishing the metal surface to be bronzed; slightly corroding said metal surface by applying to it small quantities of an acid solution consisting of water, hydrochloric acid and copper sulphate and made up in the proportion of 1000 cc. water, 20 cc. concentrated hydrochloric acid and 20 grammes crystalline copper sulphate; removing acid residues adhering to said metal surface; and treating said metal surface with a stream of gas containing ammonium sulphide in such manner that the stream of gas sweeps over the said surface, whereby an immediate brown coloration is obtained. 30

3. Process for the bronzing of copper and copper alloys, particularly brass and special brass, comprising in steps: polishing the metal surface to be bronzed; slightly corroding said metal surface by applying to it small quantities of an acid solution consisting of water, hydrochloric acid and copper sulphate and made up in the proportion of 1000 cc. water, 20 cc. concentrated hydrochloric acid and 20 grammes crystalline copper sulphate; removing acid residues adhering to said metal surface; and treating said metal surface with a stream of gas containing ammonium sulphide in such manner that the stream of gas sweeps over the said surface, whereby an immediate brown coloration is obtained. 35

4. Process for the bronzing of copper and copper alloys, particularly brass and special brass, comprising in steps: polishing the metal surface to be bronzed; slightly corroding said metal surface by applying to it small quantities of an acid solution consisting of water, hydrochloric acid and copper sulphate and made up in the proportion of 1000 cc. water, 20 cc. concentrated hydrochloric acid and 20 grammes crystalline copper sulphate; removing acid residues adhering to said metal surface; and treating said metal surface with a stream of gas containing ammonium sulphide in such manner that the stream of gas sweeps over the said surface, whereby an immediate brown coloration is obtained. 40

5. Process for the bronzing of copper and copper alloys, particularly brass and special brass, comprising in steps: polishing the metal surface to be bronzed; slightly corroding said metal surface by applying to it small quantities of an acid solution consisting of water, hydrochloric acid and copper sulphate and made up in the proportion of 1000 cc. water, 20 cc. concentrated hydrochloric acid and 20 grammes crystalline copper sulphate; removing acid residues adhering to said metal surface; and treating said metal surface with a stream of gas containing ammonium sulphide in such manner that the stream of gas sweeps over the said surface, whereby an immediate brown coloration is obtained; and after-treating said surface slightly with said acid solution, whereby any cloud or spot formation in the bronzing is eliminated.

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