METHOD OF PRODUCING A DECORATIVE FINISH ON METAL OBJECTS

Lawrence L. Green, Elmwood Park, III., assignor to Modern Metallics, Inc., Chicago, Ill.

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6 Claims

ABSTRACT OF THE DISCLOSURE

The method of forming a smooth, random marbled finish on a metal member, comprising plating the member with two superimposed contrasting layers, the outer layer being very thin, then immersing the metal member in a mass of a finishing medium comprising a multiplicity of relatively soft, erodable burnishing elements and a limited quantity of lubricant, and agitating or vibrating the finishing medium mass at a frequency of the order of 1000 to 4000 cycles per minute for a period of three to six minutes.

BACKGROUND OF THE INVENTION

There are many uses for decorative metal hardware, including various kinds of furniture and appliances for residential, commercial, and industrial applications, metal escutcheons and similar devices for cabinets, mail boxes, building hardware, and the like. In the finishing of metal hardware of this kind, one popular conventional method has entailed buffing of the basic metal member, followed by plating of the metal member with one or more layers of copper, brass, nickel, cadmium, silver, bronze, or black oxide, depending upon the final finish desired. After plating the metal member is again buffed to remove part or virtually all of the outer layer of plating, leaving a finish that includes traces of the outer plating. This basic procedure makes it possible to produce highlighted decorative metal finishes of considerable variation, with a streaked appearance that is often quite handsome. In many applications, however, particularly building hardware and casket hardware, more unusual surface finish effects may be desirable. For the most part, conventional techniques are not effective to produce a finish with substantial random variations in shading within a small surface area. The finish for hardware items of substantial size, such as the metal handle cover plates on a casket, is generally quite uniform across the surface. It has been extremely difficult to produce marbled and other random surface effects, with substantial changes in shading in a small surface area, using conventional methods. Furthermore, the available techniques for producing finishes of this kind tend to be rather expensive and to require excessive amounts of labor.

SUMMARY OF THE INVENTION

It is a principal object of the invention, therefore, to provide a new and improved production method for finishing a surface of a metal member to form a marbled surface finish affording a random mixture of contrasting surface areas that are smoothly interlaced and intershaded.

A further object of the invention is to afford a method of forming a marbled surface finish on a metal member in which the shading variations in each member are highly consistent and are not particularly dependent upon the skill of workmen doing the finishing.

An additional object of the invention is to provide a new and improved method of finishing a metal member to afford a marbled surface on that member, which method is adapted to a high rate of production at relatively low cost.

Accordingly, the invention relates to the method of finishing a surface of the metal member to form a marbled surface finish constituting a random, smoothly interlaced and intershaded mixture of contrasting surface areas, comprising the following steps:

(A) Plating the surface of the metal member with a first metallic layer.

(B) Plating the surface of the metal member, over the first metallic layer, with a thin, contrasting second metallic layer.

(C) Immersing the metal member in a mass of a finishing medium comprising a multiplicity of soft, erodable burnishing elements.

(D) Rapidly vibrating the finishing medium mass for a period of about two to ten minutes to effect mutual erosion of the burnishing elements and the second metallic layer, and thus develop a smooth, random, marbled surface finish on the metal member.

(E) Removing the metal member from the finishing media.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a simplified illustration of processing apparatus employed in the method of the invention;

FIG. 2 illustrates two of the erodable burnishing elements employed in the process of the invention;

FIG. 3 is a composite view of a casket handle cover showing the appearance of three separate segments as the finishing process proceeds; and

FIG. 4 is an end view of the plate of FIG. 3, taken approximately along line 4—4 therein.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention constitutes a method of processing a metal member to form a marbled surface finish that affords a random, smoothly interlacing and intershaded mixture of contrasting surface areas on the surface of the metal member. The following description is based upon the finishing of a cover plate for the handle of a casket, but could equally be applied to the finishing of the escutcheon for a building mail receptacle, a cover plate or base for a household appliance or lamp, or other like objects. The starting material is assumed to be a sheet steel member that has previously been shaped to the required configuration by conventional manufacturing techniques.

At the outset, the metal member to be finished in accordance with the invention is buffed or otherwise treated to afford a smooth surface finish. The member is then plated with a first metallic layer that provides the base layer for the ultimate finish. This initial metallic plating layer may be relatively thick. The first metallic layer may comprise any of a variety of different metals, such as copper, brass, nickel, cadmium, silver, or bronze. Conventional electroplating techniques are usually utilized.

The second step in the finishing process is to plate the metal member, over the first metallic surface layer, with a different, contrasting second metallic layer. For example, if the first metallic layer is brass and an "antique" brass finish is desired, the second plating employed may be a black oxide. Another example, utilized to afford a marbled finish of roseate hue, entails the use of a first metallic layer of copper plated over with a second metallic layer of silver. Other combinations can be utilized as desired. In any of the combinations, the second layer should be just thick enough to cover the first layer completely; a thick second layer may prevent optimum realization of
the decorative effects afforded by the invention and increases the cost of subsequent processing. Again, conventional electroplating methods at the surface of the metal members 15 are immersed in a finishing medium comprising a multiplicity of soft, erodable burnishing elements. The preferred burnishing elements are molded from a resin material which may include talc, chalk, or similar material as a filler. A preferred configuration for the burnishing elements is illustrated in FIG. 2. As shown therein, the unused burnishing element 10 is of truncated conical shape. When new, the burnishing elements are preferably of the order of one inch in height and of a corresponding diameter. As indicated by the used burnishing element 11 in FIG. 2, the burnishing elements reduce in size with use in the process, as described more fully hereinafter. Preferably, when the burnishing elements have worn away to a height of less than one-half inch, they are discarded and replaced.

The next step in the process is to vibrate the finishing medium mass that contains the metal members for a substantial period of time to effect a mutual erosion of the burnishing elements and the second metallic layer on the surface of the metal member. This can be carried out in an apparatus of the kind generally illustrated in FIG. 1, comprising a large container 12 having a ring-shaped internal burner 13 that is preferably lined with a relatively soft and abrasion-resistant material such as polyurethane. Container 12 may be mounted on a series of springs 14, or on other resilient mounting means permitting substantial vertical and lateral vibrational movement of the container. Commercial vibratory apparatus of this kind is well known and readily available; for example, the vibratory apparatus generally illustrated in FIG. 1 may comprise a finishing mill of the kind manufactured by Sweco, Inc. of Los Angeles, Calif.

In chamber 13, a plurality of metal members 15 are immersed in a finishing medium mass 16; mass 16 is composed of a multiplicity of burnishing elements such as the elements 10 and 11. The mass 16 also includes a limited quantity of water and a soapy lubricant to minimize scoring of the metal members 15. The mass is vibrated at a relatively high frequency. For example, using the commercial mills identified above, the vibration frequency is 1200 cycles per minute. The vibration frequency should be high enough to produce sharp, frequent impingement of the burnishing elements of mass 16 against the metal members 15; a range of 500 cycles per minute to 4000 cycles per minute is considered suitable.

The metal members 15 are vibrated in the finishing medium mass 16 for a predetermined period of time, depending in part upon the frequency of vibration and the precise quality of the finish desired. During the vibration of the metal members in the finishing medium mass, the surfaces of the metal members are sharply engaged by the burnishing elements, in a completely random manner and at high frequency, eroding the outer metallic layer and ultimately exposing portions of the inner or base metallic layer and ultimately exposing portions of the inner or base metallic layer. The longer the vibrational treatment is continued, the greater the erosion of the base metallic layer. For an “antique” brass finish, with a black oxide outer layer over a brass inner layer, extension of the vibration time produces a progressively lighter finish with less of the dark oxide remaining.

It is essential that the vibration processing continue for a substantial period of time. For a vibration frequency of 1200 cycles per minute it has been found that a period of six minutes produces satisfactory results. For a greater vibration frequency, the time requirement is reduced; with a slower vibration rate, the time is increased. Generally, the time for vibration processing should be in a range of two to ten minutes.

FIGS. 3 and 4 illustrate a composite metal member, corresponding to a basket handle part, with three segments of different finishes afforded by conventional processing and by two different embodiments of the present invention. Thus, the preferred embodiment shown in FIG. 3 includes a first segment 15A illustrating the result of conventional “antique brass” (brass under dark oxide) processing. Section 15B illustrates the finish afforded by the process of the present invention, with a vibration frequency of 1200 cycles per minute for a time period of three minutes, whereas section 15C shows the finish achieved with the method of the present invention at a vibration frequency of 1200 cycles per minute over a time period of six minutes. It should be understood that the metal member shown in FIG. 3 is purely illustrative and that a composite finish in three such sections would not ordinarily be attained. FIG. 4 is provided merely to illustrate the vertical contour of the metal member of FIG. 3.

As shown in FIG. 3, the conventional finishing process, entailing plating of the metal member with brass covered by a second metallic coating of a dark oxide, with subsequent buffing, produces a streaked black-on-brass surface finish. This can be a pleasing finish but is not the finish to which the present invention is directed.

Segment 15B of the metal member illustrated in FIG. 3 shows the finish afforded with minimum processing time, utilizing the method of the invention. The central surface 21 of the metal member, and the edge surfaces 22 and 23, have a marbled surface finish constituting a random, smoothly interlaced and intershaded surface of contrasting areas. The surfaces 21–23 are quite smooth, due to the relatively soft and erodable nature of the burnishing elements used in the processing of the surface. There are occasional sharp highlights where a bit of the brass undercoating shows completely through the dark second layer. There are also numerous relatively dark areas with only a fine tracery of brass showing through.

The third segment 15C of the metal member shown in FIG. 3 includes a central surface 24 and a peripheral edge surface 25, both of which have a marbled finish similar to the finish on surfaces 21–23 in the center segment 15B. In segment 15C, however, the vibration burnishing process has been continued for a total period of six minutes, again at a frequency of 1200 cycles per minute. Consequently, a considerably greater amount of the dark oxide outer layer has been randomly burnished away from the surfaces 24 and 25, so that the overall effect is dominated to a greater extent by the brass than in the center segment 15B. In both instances, the surface is relatively smooth and little or no additional buffing is required.

In both of the segments 15B and 15C, a rim surface 26 is shown with an appearance essentially similar to that of the conventional finished segment 15A. This is achieved by buffing the surface 26 to remove virtually all of the oxide coating and afford a contrasting surface with respect to the marbled surfaces afforded by the process of the invention.

The process of the invention does not require special electroplating techniques. The same plating procedures are used as in conventional production of burnished finishes such as that shown in the metal member segment 15A of FIG. 3. The method of the invention affords an attractive marbled finish in which the overall effect of shading variations is highly consistent, from member to member, when using the same vibration frequency and time. The quality of the finish is not dependent upon the skill of the workmen; reasonably accurate timing produces consistent results. The method of the invention is readily adapted to high production rates, yet entails minimum costs. Once the vibration equipment is available, costs are actually lower than for conventional burnished finishes.

I claim:

1. The method of finishing a surface of a metal member
to form a marbled surface finish affording a random, smoothly interlaced and intershaded mixture of contrasting surface areas, comprising the following steps:
(A) plating said surface of said metal member with a first metallic layer;
(B) plating said surface of said metal member, over said first metallic layer, with a thin, contrasting second metallic layer;
(C) immersing said metal member surface in a mass of a finishing medium comprising a multiplicity of soft, erodable burnishing elements;
(D) rapidly vibrating said finishing medium mass for a period of about two to ten minutes to effect mutual erosion of said burnishing elements and said second metallic layer and develop a smooth, random marbled surface finish on said metal member;
(E) and removing said member from said finishing medium.

2. The method of finishing a surface of a metal member, according to claim 1, in which the frequency of vibration, in step D, is between 500 and 4000 cycles per minute.

3. The method of finishing a surface of a metal member, according to claim 1, in which the frequency of vibration is 1200 cycles per minute and the vibration period is between three and six minutes.

4. The method of finishing a surface of a metal member, according to claim 1, in which said burnishing elements are of a molded resin material.

5. The method of finishing a surface of a metal member, according to claim 4, in which a limited quantity of water and a soapy lubricant is incorporated in said finishing medium mass.

6. The method of finishing a surface of a metal member, according to claim 1, in which the frequency of vibration is 1200 cycles per minute, the period of vibration is three to six minutes, and the burnishing elements are frusto-conical in configuration, and are formed from a molded resin material, with an initial diameter and height of about one inch.

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JOHN F. CAMPBELL, Primary Examiner
D. C. REILEY III, Assistant Examiner

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