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METHOD OF PROVIDING DECORATIVE METAL FINISHES

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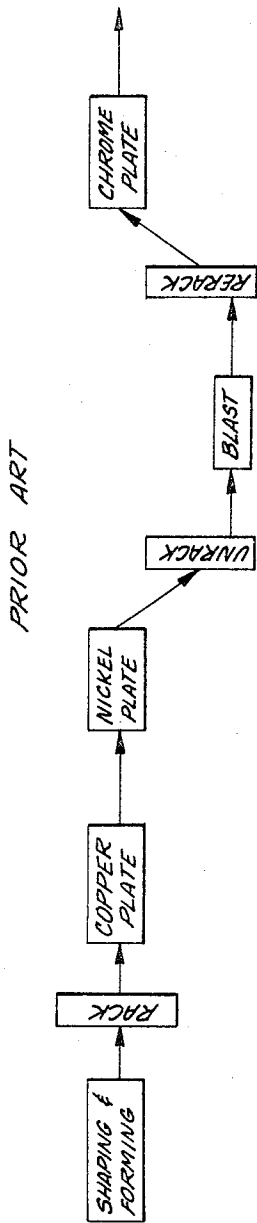


FIG. 1.

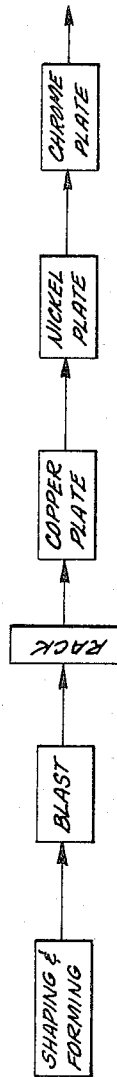


FIG. 2.

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**METHOD OF PROVIDING DECORATIVE METAL FINISHES**

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**ABSTRACT OF THE DISCLOSURE**

A method of decoratively finishing the surfaces of metals such as zinc alloys, hot and cold-rolled steels, and the like, wherein the metal articles are first abrasively blasted while in their raw and unfinished state, under relatively extreme pressure and at close range, to produce a highly roughened and deeply etched or cratered surface, after which a finish coating such as electroplated metals is applied to brighten the surface while at the same time retaining its roughly textured nature.

This invention relates to the decorative finishing of metal, and more particularly to a new method for providing a unique new type of metal finish while at the same time eliminating certain laborious and expensive steps of previous metal-finishing processes.

For a long time previous, manufactured commodities such as automobiles and home appliances have been decorated and improved in appearance by the use of pieces of metal trim whose surfaces are finished in a decorative manner. The use of such trim has in general increased with the passage of time. Initially such trim was merely polished to a high sheen. Later it was plated with a finish coat of a shiny metal, such as nickel or chrome, to produce the same result. Relatively recently, certain portions of the buffed and shiny trim pieces have been given a dull flat finish which contrasts appealingly with the shiny plated finish on other portions of the trim piece. This flat finish is a dull, basically non-reflective surface, which always in the past has been produced by the following method.

After the metal pieces of trim have been formed in the desired manner, they are first cleaned and sometimes buffed, and then are placed in appropriate racks to receive a first plating of copper and then a coating of nickel. At this stage the pieces are removed from the plating racks and put through a mild abrading process which roughens the surface of the nickel plating just enough to change its reflective properties and make it generally non-reflective. The pieces of trim are then once again placed in the plating racks, and a finish plating of chrome is applied over the entire piece of trim. This chrome plating protects the surface of the trim and makes it basically smooth to the touch, but leaves the dulled portions with a flat, contrasting mat-type of appearance.

The light abrading of the nickel-plated piece of trim which is required to produce the flat finish generally is accomplished by blasting the surface of the nickel with a commercial abrasive compound such as aluminum oxide, garnet, or glass beads, of a relatively fine size such as U.S. sieve size 100 plus 200, which is popularly known in the various manufacturing industries as "140 mesh." A considerable amount of care must be exercised in this blasting process so that the very thin plating of nickel has only its surface reflectivity reduced but is not itself eroded or eaten away by the blast. The thin surface plating of nickel may also easily be blistered or burned by the abrasive blast, thereby spoiling the entire piece of trim. Such blasting is generally done at relatively low pressures (approximately 40 to 50 p.s.i. at the blasting

nozzle) and care is taken to position the nozzle a distance away from the work piece (approximately nine to twelve inches in the usual operation).

This process is clearly laborious, trying, and expensive. The double racking of the trim pieces causes a great increase in their cost. If there are any defects in the base metal of the trim or in the preceding platings, the blasting operation markedly emphasizes them. Furthermore, the flat, dull finish finally obtained actually is not distinctive in itself, and only is attractive by its contrast to the shiny metal surfaces about it. As a result, although the foregoing process is actively in use by many manufacturers, others have recently developed an epoxy paint which actually comes very close to duplicating the non-reflective mat finish obtained by blasting, and is very much cheaper to produce, although less durable and subject to marring.

Although the foregoing process has the many limitations indicated, it nonetheless is quite extensively used, since aside from the paint described, no acceptable alternative method has yet become known.

The present invention has as one of its major objects the provision of a unique new method for providing a roughened and generally non-reflective surface finish which eliminates much of the trouble, care, and labor required by the previous method, and which is consequently significantly less expensive to produce.

Another major object of the present invention is to provide a method for imparting a unique new textured finish to decorative metal pieces, which presents new possibilities in the field of esthetics and design.

These major objects, together with many lesser but still important objects of the present invention, as well as multiple advantages attained by its usage will become increasingly apparent upon consideration of the following specification and its appended claims, especially when taken in conjunction with the accompanying illustrative drawings.

In the attached drawings;

FIG. 1 is a flow chart which shows the steps of previous processes (designated prior art); and

FIG. 2 is a second flow chart showing the steps of the present inventive process.

Briefly stated, the present invention provides a method for imparting a unique roughened or textured finish to decorative metal trim pieces, which finish has an unusual glitter or sparkle, while at the same time being generally flat and substantially non-reflective in appearance relative to shiny chrome-plated adjacent areas of the trim piece. Furthermore, the attractive new textured finish is produced by a new method which is faster and less expensive than previous methods, and which eliminates certain laborious and costly steps therefrom. The new method basically involves treating the metal trim pieces in their raw or unfinished state, and before any plating or special finishing treatment has been given to them. In this new method, the raw pieces of metal trim are harshly blasted at close range and under high pressure with a dry abrasive media, preferably glass shot, to such an extent that the raw metal surface is deeply etched relative to the previous method of treating the nickel-plated trim. Once this blasting step has been completed, the metal trim is then racked a single time for finishing, and without any interruption it is given the complete finish applications. This may include anodizing in a case of aluminum trim, or the triple platings of copper, nickel, and chrome in the case of such alloys as the zinc-base die cast metal which has become a standard throughout industry. The finish coatings are applied directly over the raw piece of trim, both to the blasted roughened area, and also to certain areas on the trim piece which have been masked or otherwise

isolated from the blasting process, and which accordingly are smooth and shiny. Thus, the completed pieces of trim require only about one half of the labor expenditure of the previous method, since both the blasting and the plating processes are separate from each other and continuous, and only a single racking and unracking of the trim pieces is required, not a double such action. The blasting in the present method is carried out generally by an abrasive media which is coarser than that of previous methods, and which is directed at the trim pieces under considerably greater pressure and at a much closer range, so that the effects are altogether different. Indeed, the blasting standards of previous methods would be ineffectual in the present method, whereas the blasting standards of the present method would utterly destroy the nickel plating of the previous method. Furthermore, the resultant finish is very much different and has a heretofore unknown rough-textured, glinting appearance which is at once ruggedly individualistic and cultured and finished in appearance.

Referring now in greater detail to the invention and to the drawings, the method used to produce textured decorative finishes upon objects of metal trim prior to the present invention is illustrated by the flow chart of FIG. 1. As has previously been noted, this method is considerably more painstaking, laborious, and costly than that of the present invention, since the step in which the piece of trim is blasted occurs in the midst of the plating process, after a plating of nickel has been applied thereto but prior to the application of a plating of chrome. Consequently, as the chart shows, all of the pieces of trim have to initially be placed in racks for the copper and nickel plating processes, unracked for the blasting operation, and then re-racked for the chrome plating process.

When the method of FIG. 1 is compared to my new method shown in FIG. 2, it will immediately be noted that the time-consuming and expensive process of unracking and then re-racking each piece of trim has been eliminated. When it is recalled that the chief expense in such a finishing process lies in the handling and labor expenses, it will be appreciated that my new method results in a very considerable savings which heretofore could not be obtained, and which may be passed on to the ultimate consumer.

Such a saving is not obtained merely by rearranging the identical steps in the two processes. It requires far more effort than the simplicity shown by the figures would appear to present, although this simplicity in itself is integral with and inseparable from the inventive concept here involved. One important underlying and concealed difference between the previous method and my own is that an entirely new type of textured finish having unique reflective qualities had to be perfected in order to render practicable and of any value whatsoever the labor-saving differences between the order of the steps in the two methods. The differences in the steps themselves is illustrated by the blasting techniques which are involved.

These differences in blasting techniques center mainly upon the impact intensity used, but they also involve the most preferred media. As has been stated, the previous method was a careful and painstaking one carried out with a medium-to-fine abrasive at approximately 40 to 50 p.s.i. of blasting pressure, with the nozzle positioned at least nine inches from the work piece and frequently as far as twelve inches therefrom. These precautions were necessary to insure that the nickel plating would receive only the lightest roughening effect to dull its reflectivity, without damaging or penetrating the plating.

In my own method, however, I prefer to use a coarser media (most preferably 80 to 100 "mesh," i.e., U.S. sieve size 60 PLUS 100 to 70 PLUS 140), and to use blasting pressures of approximately 70 to 90 p.s.i. or even greater (with reference to the typical  $\frac{1}{8}$ " to  $\frac{5}{16}$ " diameter nozzle air jet orifice of a conventional venturi-type blasting gun or nozzle). Furthermore, the blast nozzle is positioned very close to the work piece. At times and for some particu-

larly rough and deeply cratered finishes, this distance is as close as one-half inch, although generally it is slightly further than this, more often being in the neighborhood of three to four inches, but never exceeding eight inches. Thus, it will be observed that the blasting techniques of the present method actually begin beyond the point where previous methods of necessity had to stop, and take place in an area which previously was both untried and forbidden.

Many different kinds of metal may be found in the various pieces of trim to which the method may be applied. These include aluminum extrusions, cold-rolled steel, stainless steel, and most particularly the zinc-base die-cast alloy which has become a standard in the industry for such usage. Moreover, a variety of different dry abrasive medias may be used in practicing the method upon these different metals, including aluminum oxide particles, garnet, steel and iron grit, cut-steel wire, and plastic and glass beads, which all produce changes in degree in the crisp, frosty, textured metal finish produced by my method.

In accordance with all of the foregoing data, it will be seen that in general specific values for the blasting parameters of the present invention fall within the range of a minimum of about 60 p.s.i., and at a nozzle distance of not more than about eight inches, depending of course upon the specific type of metal of which the trim is composed. In the case of the typical zinc-base die-cast metal, for example, the blasting pressure should be about 75 p.s.i., and the typical nozzle should be placed at a distance of about four inches from the metal. On the other hand, for raw unfinished aluminum trim which is of course a softer metal than the die cast alloy noted, the blasting pressure should be about 60 to 65 p.s.i., if the nozzle is placed at a distance of about four inches from the trim. In connection with such specified blasting pressures, it should be stated that, as those skilled in the art will immediately understand, these refer to the pressure of the air which is fed directly into a venturi-type nozzle, which pressure is usually monitored by pressure gauges, and not to the pressure at the gun outlet, which is never monitored. While straight-through or direct-type blasting nozzles (as opposed to the aforesaid venturi-type) may be used in the process, they are not the preferred means. If such straight-through nozzles are used, the foregoing pressure figures may readily be converted to those appropriate for straight-through type blasting nozzles, by means of conventional correlation constants available from many sources and well understood in the trade.

While different types of blasting media may be used in accordance with the blasting parameters of the instant method to produce frosted finishes which are related in kind but which vary in degree, by far the most preferred media is glass shot, a relatively recent discovery in the field of abrasive blasting, although now in use for some time. The present method uses the glass beads in an entirely different manner from that in which they are ordinarily used, however. Presently these beads find use in three major categories, including the cleaning of various slag and carbon deposits from metal pieces, the peening or cold-working of various articles, and the finishing of metal surfaces by polishing them to a high sheen. Indeed, it is the polishing ability of glass beads which is the aspect most widely publicized, since the beads are said to have a certain elasticity which supposedly prevents them from deeply etching into metal and which enables them to impart very fine and highly polished finishes to metal surfaces. One manufacturer of glass beads specifically states that upon striking a surface, the beads are elastically deformed and assume the contour of the surface, distributing the impact over a broad area and greatly reducing the danger of damage or rupture to the surface, which supposedly assures a surface free of deep etches or gouges. It is this polishing ability of the glass beads which generally is most desired, and it is said that should the kinetic energy of the beads be increased so that the force with

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which they are impacted exceeds the compressibility of the metal being treated, the beads will shatter without further penetration into the metal. The beads are said to thus produce finishes which are even more uniform than are ground surfaces.

In the present method, however, the beads are blasted against the surface of the metal trim with such force that they regularly shatter, and their consumption is considerably more than double the rate normally found when glass beads are used to polish or clean. Indeed, normally the beads in the blasting apparatus require changing only once every working shift, whereas in the present method they are impacted against the working surface with such intensity that the beads must be replaced at continuous brief intervals of twenty to thirty minutes during each shift. Moreover, considerable surface metal is removed from the work piece, and the fine metal powder so produced is plainly present in abundance in the blasting media. This metal powder cushions the harsh blasting effects upon the trim piece and contributes to the requirement of having to completely change the glass bead media at such brief intervals. Moisture in the media has a similar cushioning effect, and consequently it is very important that a thoroughly dry media be used exclusively.

Thus, although the novel method of the present invention may be practiced by using different specific sets of values for such parameters as type of blasting media, blast pressure, and distance from nozzle to work piece, it will be seen that in general a qualitative minimum impact intensity is to be observed rather than a quantitative one, and this is that impact intensity at which dry glass beads would normally and regularly shatter while actually removing metal from the surface of the work piece. This criteria is to be contrasted with the method of blasting previously used, where the abrading operation followed the step of plating the trim piece with nickel, in which great care had to be exercised not to remove any surface metal. In employing glass beads in the manner disclosed in this invention, a distinctive bright glitter is imparted to the rather deeply etched surface, and the unique textured finish resulting when the trim piece has received a finished coating (such as the normal triple plating of copper, nickel, and chrome) is recognized as being unique in the metal-finishing industry.

There is a further aspect of the present inventive method. This involves the non-directional character of the roughened, textured finish obtained through its practice. Whenever in the past a finish even remotely resembling the one obtainable by the present method was desired, the only known way to obtain it was by "brushing" the nickel or chrome plated surface of the metal with a rotary or other unidirectional mechanical roughening tool. This left "brush strokes" on the surface plating of the metal. The only real practicability of this method lies in the finishing of relatively small objects. When large pieces of trim are involved, only a portion of the surface may be brushed in a single stroke. Consequently, the many different strokes required to finish a single piece had to be carefully blended into each other in order to provide a finish which could even be said to approach uniformity. This was an enormously painstaking task whose results were far from perfect, and in most cases were obviously and perceptibly non-uniform. Moreover, when a surface of this nature had to be perfected by touching up, it usually amounted to refinishing substantially the entire surface, since it was practically impossible to unobtrusively retouch a brushed surface.

In complete contrast to the foregoing difficulties, the present unique method first provides a finish which is considerably more attractive than the directional brushed finish, but even more importantly, it provides a finish which is non-directional and which is completely uniform. Consequently, any desired area may be quickly and effortlessly retouched, since all such areas effortlessly blend together and there is no trace of any juncture line.

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Although I have disclosed throughout this specification many of the different aspects of my invention, and have described in detail the embodiment thereof most preferred by me, those skilled in the art to which the invention pertains will soon perceive that the invention is in its broader aspects susceptible to certain modifications in detail and particularity. Consequently, all such modifications as incorporate the spirit of the invention and which depend upon its inventive concept are to be considered a part of the invention, unless the claims appended below by their language expressly state otherwise.

I claim:

1. A method of producing decorative textured metal surface finishes having an unusual roughened and sparkling appearance, comprising the steps of: impacting a dry glass bead blasting media against surface portions of zinc alloy, rolled steel, and like metals while the same are in a raw and unfinished condition under extreme pressure and at close range, such that metal is visibly removed from said surface and said glass beads are rapidly fractured and fragmented, thereby producing a uniformly and non-directionally roughened surface characterized by a sharply and densely-cratered appearance; and thereafter applying a finish coating to said surface atop said roughened blasted area.

2. The method of producing a textured decorative finish recited in claim 1, wherein said step of applying a finish coating to said surface comprises an electroplating process.

3. The method of producing a textured decorative finish recited in claim 1, wherein said step of applying a finish coating to said surface comprises an anodizing process.

4. A method of producing decorative textured metal surface finishes having an unusual roughened and sparkling appearance, comprising the steps of: impacting a dry glass bead blasting media against surface portions of industrial-type metal trim pieces of zinc alloy, hot and cold-rolled steel, and the like while the same are in a raw and unfinished condition under not less than 60 p.s.i. blasting pressure from a nozzle having a jet orifice not exceeding five-sixteenths inch in diameter, which is positioned at a distance from said surfaces not exceeding eight inches, such that metal is actually removed from said surface and said glass beads are rapidly fractured and fragmented thereby producing a uniformly and non-directionally roughened surface characterized by a sharply and densely-cratered appearance; and thereafter applying a finish coating to said surface atop said roughened blasted area.

5. A method of producing a textured decorative finish having an unusual roughened and sparkling appearance upon the surface of zinc-base die cast metal trim pieces, comprising the steps of: impacting a glass bead blasting media against portions of said metal surfaces while the same are in a raw, unfinished condition, at blasting pressures of at least 75 p.s.i. from a nozzle having a jet orifice not exceeding five-sixteenths inch in diameter, which is positioned at a distance from said surfaces not exceeding six inches, such that metal is actually removed from said surface and said glass beads are rapidly fractured and fragmented, thereby etching said surface relatively deeply and producing an area having a sharply etched and roughened texture; and thereafter applying a finish coating to said surface atop said roughened blasted area.

6. A method of producing a textured decorative finish having an unusual roughened and sparkling appearance upon the surface of aluminum trim pieces, comprising the steps of: impacting a glass bead blasting media against portions of said metal surfaces while the same are in a raw, unfinished condition, at blasting pressures of at least 60 p.s.i. from a nozzle having a jet orifice not exceeding five-sixteenths inch in diameter, which is positioned at a distance from said surfaces not exceeding six inches, such that metal is actually removed from said surface

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and said glass beads are rapidly fractured and fragmented, thereby etching said surface relatively deeply and producing an area having a sharply etched and roughened texture; and thereafter applying a finish coating to said surface atop said roughened blasted area.

7. A method of producing a textured decorative finish having an unusual roughened and sparkling appearance upon the surface of trim pieces of zinc alloy, hot and cold-rolled steel, and like metals, comprising the steps of: impacting a dry blasting media against portions of said metal surfaces while the same are in a raw and unfinished condition under sufficiently high pressure and sufficiently close distance conditions as to normally rapidly fracture and fragment a glass bead media while actually removing metal from said surface, thereby producing a uniformly and non-directionally roughened surface characterized by a sharply and densely-cratered appearance; and thereafter finishing said trim pieces by plating the same directly atop said roughened blasted area.

8. A metal trim article having a surface with a decorative finish produced in accordance with the process of claim 7.

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9. A method of producing a textured decorative finish having an unusual roughened and sparkling appearance upon the surface of trim pieces of zinc alloy, hot and cold-rolled steel, and like metals, comprising the steps of: impacting a dry blasting media against portions of said metal surfaces while the same are in a raw and unfinished condition under blasting pressure range-to-distance conditions of from about 7 to 12 p.s.i. per inch, to produce a uniformly and non-directionally roughened surface characterized by a sharply and densely-cratered appearance; and thereafter finishing such trim pieces by electroplating the same over said roughened blasted area, with plating amounts less than those which would fill and level-off said roughened and cratered surface.

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