

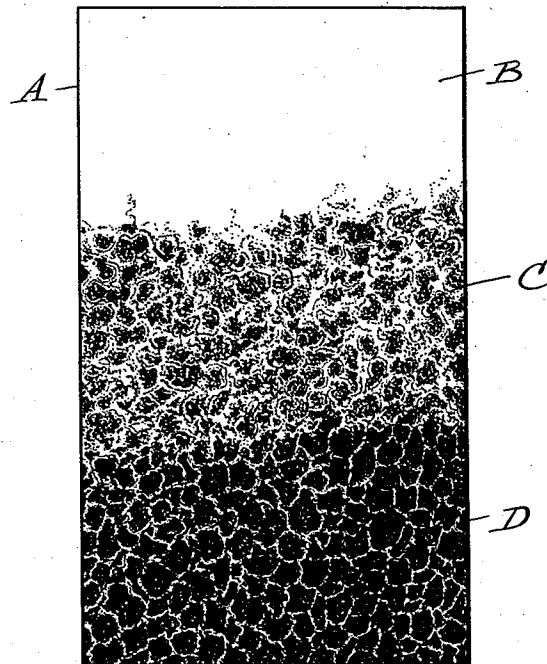
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SURFACE FINISH AND METHOD OF MAKING THE SAME

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SURFACE FINISH AND METHOD OF MAKING
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This invention relates to improvements in the finishing of metal, wood and other surfaces. More specifically, it relates to finishes having multi-toned metallic effects.

5 Various methods are known for producing two-toned finishes and some of these methods produce two-toned metallic effects. However, previous methods require the use of two or more paint products and require at least two separate and distinct finishing operations. Some previ-
10 ous methods suffer the disadvantage that they require the use of brittle materials, others require baking. None of the previous methods gives a finish that is readily repaired in case
15 of damage.

One of the objects of this invention is to produce from a single liquid paint a finish having an uneven surface and a multi-toned effect. Another object of this invention is to produce a
20 finish that closely simulates the appearance of hammered metal. A further object is to provide a finish of this kind which is tough and durable, and which can be produced either with or without baking. A further object is to produce a multi-toned finish which can readily be re-
25 paired in case of damage.

A further object of this invention is to provide an improved method of producing a multi-toned finish. Another object is to provide a method
30 for economically producing a finish simulating the appearance of hammered metal.

Another object of this invention is to produce paint compositions for producing our improved finishes; also to produce a paint composition, an
35 ingredient of which migrates after application to a surface, so as to produce a multi-toned effect; also to produce a paint composition, which when spattered on a surface, produces a hammered metal effect.

40 Other objects of the invention will appear in the following description and claims.

Broadly according to this invention, droplets of a paint, either clear or pigmented and having finely divided metal suspended therein, are pro-
45 jected against the surface to be finished. These droplets, upon striking the surface spread out to form spots or small areas having ridges at the edges of the areas, and the finely divided metal migrates to these ridges before the paint sets,
50 thus forming in each area a rim or edge portion having the color of the finely divided metal, and a central portion or crater having the tone or color of the granular pigment or dye.

55 The word "tone" is herein used to designate

different colors, as well as different hues or shades of the same color.

More specifically, the foregoing objects can be accomplished by incorporating in a thin oleoresinous, resinous or nitrocellulose vehicle a flake
5 metallic powder and a granular pigment, and applying the paint or lacquer by spraying in such a manner that the paint is broken up into small droplets instead of the fine mist produced by
10 conventional spraying methods. For example, when using an air pressure spray gun the droplet spray may be produced by the use of a special spray head for spattering, or it may be produced
15 with the usual equipment by greatly reducing the air pressure at the nozzle and using a low pressure in the paint container to force the paint
20 to the nozzle. Spray guns which operate on the principle of centrifugal force may also be employed, if they are operated at speeds just sufficient to produce droplets of the desired size.

Best results have been obtained by first applying a scanty coat that does not entirely cover the surface, allowing this coat to "set" for 15 to 60
25 seconds and then applying a second coat in the same manner, taking care to completely cover the surface. However, the hammered effect may also be produced by a single coat applied sufficiently heavy to cover the entire surface. The
30 hammered appearance develops almost immediately after the paint is applied and the paint may then be air-dried or baked.

When the paint is applied as described above, the droplets discharged from the gun upon striking the surface spread out to form more or less
35 circular spots or areas which present the appearance of craters surrounded by shallow ridges at the edges thereof. The metallic powder migrates to and concentrates at the ridges, while the granular pigment is more concentrated in the craters of the areas formed by the droplets.
40 Thus, at the ridges about the craters the color of the metallic powder predominates, while the color of the craters is modified by the color of the granular pigments. Thus, by selection of the metal powder and the granular pigments, two-toned effects resembling hammered metal can be
45 produced.

The compositions which may be used for carrying out this process may vary greatly as to their ingredients and proportions. It has, for
50 example, been found that good results can be obtained by using as the clear vehicle either oleoresinous varnishes, alkyd resins of the oil modified type or clear nitrocellulose lacquers. The vehicles can be chosen so as to be suitable either
55

for air drying, for baking, or for both. The concentration of the granular pigment in the finished composition should be relatively low in order to permit the metallic powder to migrate freely to the rims of the craters, probably under the influence of surface tension, also to avoid unduly obscuring the color of the metallic powder. The finished composition should be rather thin in consistency and thus the amount of solvent or thinner is greater than is ordinarily used in paint compositions. The solvent mixture should evaporate more rapidly than in ordinary brushing materials in order to prevent the ridges of the craters from leveling out and also to prevent running or sagging on vertical surfaces. At the same time, the solvent must evaporate slowly enough to allow the areas formed by the droplets to blend together and to permit the metallic powder collecting in the ridges of the craters before the film has "set". For example, the preferred viscosity for the finished composition when the vehicle is an oleoresinous varnish is $\frac{1}{2}$ to 1 poise. At this consistency, the preferred pressure at the nozzle of the spray gun ranges from 1 to 3 pounds and the preferred pressure on the paint is 5 to 10 pounds. Paints of slightly higher viscosity may be used if somewhat higher pressures are employed. We have found that viscosities as high as 3 poises may be used, in which case the pressure at the nozzle of the gun may be as high as 5 pounds and the pressure on the paint may be as high as 20 pounds. The composition of the paint must be such that it readily wets the surface on which it is applied; otherwise, there is likelihood of the surface being incompletely covered with the paint, so that a continuous film will not be obtained.

The metal powders used are in flake form and coated with a fatty acid or soap and may be of the form commercially available. The quantity of metal powder per gallon of finished composition depends upon the particular metal powder employed and also may be varied to produce different effects. It has been found that from $\frac{1}{2}$ of 1% to 35% by weight of metal powder may be used. The most practical range of metal powder, however, is from about 1% to 5%. While more than 5% can be used, yet because of the relatively high cost of these metals powders, the higher percentages may be avoided, particularly since very excellent results can be obtained within the range of from 1% to 5%.

The amount of granular pigment also varies greatly with the hiding power of the particular pigment employed and with the effect desired, and good results have been obtained by using from $\frac{1}{2}$ of 1% to 40% of granular pigment. The most satisfactory results have been obtained by using from $\frac{1}{2}$ to 12% of pigment.

In the manufacture of the composition a paint containing granular pigment only is first produced. Just before the material is to be used the metallic powder in the form of either dry powder or a paste comprising metallic powder and mineral spirits is mixed into the paint. The whole is then thinned to the proper consistency for application as defined above.

It is possible to use in place of granular pigments or in connection with granular pigments, suitable soluble dyes. When a dye is used attractive effects may be obtained by applying the finish over a bright surface, such for example as tin plate, in which case the bright surface shows

through the paint and imparts a brighter appearance to the craters.

Referring to the drawing, the figure represents a panel or portion of a surface, one part of which is uncoated, another part being sprayed with one coat, and the lower part of which has two coats applied thereto. In this figure, A represents a panel or portion of a surface. The upper part B of this panel is uncoated, the middle part C has a single coat applied thereto, and the lower part D is covered with two coats. It will be noted that a single coat scantily applied, as shown in part C appears to have a series of spots or areas each produced by one or more droplets and that portions of the surface are not covered by the paint. Moreover, there appear crater portions in which the granular pigment predominates and edge portions to which the metallic powder has migrated. The two coat part D of the panel shows the complete finish produced in accordance with this invention. It will be noted that in this part of the panel a series of areas are formed, each of which is surrounded by a ridge indicated in light color in the drawing. In these ridges, the metal powder has collected, probably because of surface tension between the metallic flakes and the vehicle, thus leaving in the middle portion of each area a crater containing relatively low concentration of the metallic flakes. Since the droplets which form these areas are fairly close together and in many cases overlap each other, the ridges containing the metal flakes are of irregular outline and simulate closely a hammered metal surface.

The surface to which our improved finish is applied should be relatively non-porous. If it is desired to apply the finish to a porous surface, such as wall board, plaster, or leather, it is desirable to first apply some material that will satisfactorily seal the surface or overcome the porosity. The surface to be finished should be moderately smooth, although one of the advantages of our improved finish is that minor imperfections in the surface are obliterated by the finish.

It will be obvious from the foregoing that a great variety of effects can be obtained by using different metal powders and granular pigments or dyes of different colors. If a light colored metal powder, such as aluminum powder, is used with a dark colored granular pigment, the rims of the craters will be light and the centers will be dark, while a dark colored metal powder, such as copper bronze, with a light colored granular pigment produces the opposite effect. All of the foregoing effects are produced by one or more, usually two, coats of the same liquid composition. However, still other effects can be produced by using paints of two colors in two successive coats, allowing only the usual very short "setting" time between coats. The effects produced in this way have an uneven surface similar to hammered metal, the effect as to color being quite different than hammered metal but novel and attractive.

Most multi-toned effects are difficult to repair should the workmanship prove defective or should the finish be damaged subsequent to completion. However, in the case of the finish produced by the present invention imperfections are readily corrected by simply applying an additional coat of the original material, either immediately following the customary second coat or following the complete drying of the system. This extra coat blends into the previous coat so

that there is no evidence that the finish has been repaired.

While in the foregoing we have referred to various coats, it should be understood that from the standpoint of production and economy our finish is essentially a one operation finish, since each coat is preferably applied almost immediately following the preceding coat and all coats are dried together. The advantages of such a finishing method from the standpoint of simplicity and economy are obvious.

The following examples illustrate compositions which have been successfully used in producing our improved finish, but it is not intended to limit this invention to the examples given, since it will be obvious that innumerable changes can be made to produce various desired effects without departing from this invention. In these examples the proportions stated are by weight.

Example I

The following paint made with oleoresinous varnish may be used to produce a two-toned effect consisting of blue-grey color contrasted with aluminum powder:

	Percent
Ultramarine blue.....	7.62
Lithopone.....	4.55
30 Lampblack.....	0.01
Extra fine lining aluminum powder.....	3.07
China-wood oil-limed rosin varnish (50 gal. length; 45% non-volatile matter).....	3.65
35 China-wood oil-amberol resin varnish (15 gal. length; 50% non-volatile matter).....	39.10
Varnish makers' & painters' naphtha.....	37.00
	100.00

This paint was applied on a smooth steel panel with a spray gun using a pressure of two pounds at the nozzle and seven pounds on the paint. The nozzle was held at a distance of about 18 inches from the surface being coated, and the paint was applied in two thin coats, the first coat having been applied so scantily as to not entirely cover the surface and the second coat was applied within thirty seconds after the application of the first coat, and in the same manner as the first coat. The paint was then baked for forty-five minutes at a temperature of approximately 250° F.

The resulting finish showed a series of areas varying from 1/8th of an inch to 3/8ths of an inch in diameter. The craters of the areas are of a blue color and the edges of these spots are aluminum color.

Example II

By means of the following formula, an effect can be produced which closely simulates hammered steel, and which may be applied to metal, wood or other surfaces:

	Percent
65 Carbon black.....	1.00
Extra fine lining aluminum powder.....	3.20
China-wood oil-amberol resin varnish (15 gal. length; 50% non-volatile matter).....	40.50
70 China-wood oil-resin varnish (46.3 gal. length; 45% non-volatile matter).....	12.08
Varnish makers' & painters' naphtha.....	42.20
Liquid drier (cobalt linoleate).....	1.02
	100.00

This paint is applied to the surface by means of a spatter gun or as described in Example I. The finish thus produced dries in air. In this case the craters produced by the droplets are of grey color and the rims or edges are of lighter grey, thus producing the appearance of hammered steel.

Example III

The following formula has been found to produce a good color contrast, and when applied in accordance with this process, closely simulates hammered copper:

	Percent
Maroon lake.....	5.70
Bone black.....	5.90
Lithopone.....	0.89
Venus natural copper powder.....	4.75
Heat bodied perilla oil.....	8.50
China-wood oil-amberol resin varnish (15 gal. length; 50% non-volatile matter).....	38.10
Varnish makers' & painters' naphtha.....	26.10
Toluol.....	10.05
Liquid drier (cobalt linoleate).....	0.01
	100.00

This paint is applied to the surface and baked in the same manner as stated in connection with Example I. In this finish the background or interior of the areas formed by the droplets is brown and the edges are of bright copper color.

Example IV

The following resinous base composition is used for producing a hammered steel finish:

	Percent
Carbon black.....	0.51
Antimony oxide.....	9.68
Diatomaceous earth.....	1.54
Aluminum bronze paste.....	1.54
Alkyd resin solution (50% resin, 50% solvents).....	47.94
Mineral spirits.....	1.74
Varnish makers' and painters' naphtha.....	19.40
High flash coal tar naphtha.....	1.22
Xylol.....	0.07
Toluol.....	16.36
	100.00

The aluminum bronze paste specified in the formula comprises about 66% aluminum powder and 34% mineral spirits.

After the paint has been applied to a surface in the manner already described in connection with Example I, the coating is baked for an hour at 250° F. to produce a hard tough finish of uniform sheen. The foregoing formula may, of course, be varied by using other colors and other metallic powders or pastes.

Example V

Satisfactory results have also been obtained by using equal parts of a well known nitro-cellulose black lacquer enamel and a thinner therefor, and adding to this mixture about 3% of amyl acetate. A metallic paste such as aluminum bronze paste is added to the resulting composition to the extent of about 2 oz. per gallon. This material pro-

duces a hammered steel effect. The resulting paint will have the following composition:

	Percent
5 Nitro-cellulose	5.57
Lewisol resin No. 1	4.79
Dibutyl phthalate	1.53
Aluminum bronze paste	1.64
Carbon black	0.61
10 Copper oleate	0.06
Ethyl acetate	2.87
Butyl acetate	21.96
Amyl acetate	2.95
Butyl alcohol	12.07
15 Denatured alcohol	2.42
Toluol	5.98
Xylol	4.78
Union oil solvent No. 8	21.20
Lacolene	11.57
20	100.00

Lewisol Resin No. 1 is a maleic acid modified ester gum manufactured by John D. Lewis, Inc.

The aluminum bronze paste specified in the formula comprises about 66% aluminum powder and 34% mineral spirits.

Union oil solvent No. 8 is a volatile petroleum distillate produced by Union Oil Company of California. It is characterized by the presence in substantial amount of aromatic and olefinic constituents and distillation as follows:

	Degrees Centigrade
Start	98 to 98
25 50%	107 to 108
90%	118 to 120
Dry point	122 to 129

Lacolene is a volatile petroleum distillate produced by R. J. Brown Company and designed primarily as a toluol substitute in nitrocellulose lacquer formulas. It is characterized by rapid, complete evaporation and distillation as follows:

	Degrees Centigrade
Start	90 to 99
45 50%	103 to 105
90%	111 to 117
Dry point	122 to 129

The words "coloring material" as herein used are intended to designate granular pigments and/or soluble dyes.

We claim as our invention:

1. A method of finishing a surface to produce a multi-toned metallic effect, which includes spattering upon the surface a paint having a thin vehicle formed with a base selected from a group consisting of oleoresin, resin and nitrocellulose, and diluted to a viscosity of from one-half to three poises, and containing a coloring material and a metal powder, said spattered paint forming on said surface small connected areas having the metal concentrated in the edge portions thereof.
2. A method of finishing a surface, to produce a multi-toned effect, which includes spattering upon said surface droplets of a paint having a

substantially transparent vehicle containing coloring material and having metallic flakes in suspension, said paint having a viscosity from $\frac{1}{2}$ to 3 poises, said droplets spreading on said surface over small areas having said metal in greater concentration at the edges of said areas than at the interior portions thereof.

3. A method of finishing a surface, to produce a multi-toned effect, which includes projecting upon said surface droplets of a paint having a vehicle containing a granular pigment and having in suspension therein a metal powder, said paint having a viscosity of from $\frac{1}{2}$ to 3 poises, said droplets spreading on said surface over small areas which leave said metal in greater concentration at the edges than at the interior portions of said areas.

4. A method according to claim 2, in which the paint is sprayed by air pressure from 1 to 5 pounds per square inch.

5. A method of finishing a surface, to produce a multi-toned effect, which includes projecting by means of a jet of air at a pressure of from 1 to 5 pounds per square inch a paint having a viscosity of from $\frac{1}{2}$ to 3 poises, and containing coloring matter and having suspended therein from one-half of one percent to thirty-five percent of a finely divided metal in flake form, delivering said paint to said jet of air at a pressure of from 5 to 20 pounds per square inch, said droplets spreading on the surface over small areas adjoining and overlapping each other, each of said areas having the finely divided metal in greater concentration at the edges thereof than in the interior portions.

6. A method of finishing a surface, to produce a multi-toned effect, which includes projecting by means of a jet of air at a pressure of from 1 to 3 pounds per square inch a paint having a viscosity from $\frac{1}{2}$ to 1 poise and containing from one-half of one percent to twelve percent of a granular pigment and from one percent to five percent of a finely divided metal in flake form, delivering said paint to said jet of air at a pressure of from 5 to 10 pounds per square inch, said droplets spreading on the surface over small areas adjoining and overlapping each other, each of said areas having the finely divided metal in greater concentration at the edges thereof than in the interior portions.

7. A method of finishing a surface to produce a multi-toned metallic effect, which includes spattering upon the surface a paint having a thin vehicle formed with a base selected from a group consisting of oleoresin, resin and nitrocellulose, and diluted to a viscosity of from one-half to three poises, and containing a metal powder, said spattered paint forming on said surface small connected areas having the metal concentrated in the edge portions thereof.

8. A method according to claim 1 in which the coloring material is a dye.

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