Patented May 17, 1938 2,117,289

UNITED STATES PATENT OFFICE

2,117,289

METHOD OF PREPARING A SURFACE

David A. Bosley, Jr., Lakewood, Ohio, assignor to The Glidden Company, Cleveland, Ohio, a corporation of Ohio

No Drawing. Original application May 26, 1933, Serial No. 673,107. Divided and this application December 17, 1934, Serial No. 757,892

3 Claims. (Cl. 91—68)

This application is a division of applicant's copending application Serial #673,107, filed May 26, 1933.

This invention relates to priming paints for use over metal and other surfaces, and has particular reference to an improved method of formulating such products for use under sanding surfacers, and more particularly to a method of finishing surfaces by the use of my new priming paints. It contemplates a radical departure from old pigment combinations used in these materials.

When high-grade finishes are to be applied to surfaces, it is common practice to include three types of coatings in the finishing schedule: a primer, for adhesion and rust inhibition; one or more surfacing coats, to be surfaced by a sanding or similar operation; and one or more finishing coats, as a protective and ornamental finish. The finishing coats are very often sanded and polished; this is particularly true in the nitrocellulose lacquer enamel finishing of automobiles and similar objects. The repeated sanding operations very often abrade the surface to the primer; and with the primers in common use heretofore, the surface is often cut down clear to the metal. This necessitates the spotting in of a touch-up primer, and the building up of the system anew—an expensive, time-wasting series of operations. Furthermore, while most primers are baked, the touch-up primer is generally of an air-drying nature, and is a source of potential trouble in service.

My invention consists, basically, in formulating the primer so that, on sanding of the top coats, when the primer is reached, it will resist the action of the abrasive, and tend to abrade the sand-paper or sanding wheel to the same extent as the sand-paper abrades the primer, or to a greater degree. I accomplish this by incorporating into the primer a pigment as hard as, or harder than, the abrasive to be employed. Since a primer vehicle generally holds its pigment much more tightly than the abrasive is held to the paper, and the abrasive cannot scratch the pigment, it is either abraded itself, or dusted off from the paper or wheel, falling or being mechanically swept off the surface by the operator.

In the formulation of primers of the prior art, various vehicles have been used, including nitrocellulose lacquers, varnishes of natural and synthetic gums, and synthetic resin solutions. Pigments of three classes have been employed with these vehicles; rust inhibitive pigments, such as red lead and zinc chromate, etc.; covering pigments, such as lithopone, zinc oxide, white lead, iron oxide, etc.; and cheap non-covering inert pigments which give filling. These pigments have been dispersed in the vehicles in various types of paint grinding equipment, including buhrstone, pebble and steel roll mills. In order to get easy dispersion, and to minimize abrasive action of the mills, the paint industry has always preferred soft pigments. The covering and rust-inhibitive pigments are generally manufactured and are very soft; a hardness of above 2.5 on the Moh scale is very rare. The mined pigments, iron oxide, the umbers and siennas, etc. are somewhat harder; but the softer grades are preferred for paint work, and it may be concluded that these pigments do not exceed 5 in hardness. The softer inerts are preferred—magnesium silicate, kaolin and barytes do not exceed 2.5—calcite has a hardness of 3 and the various talcs may be as low as 1 in hardness. The only common inert of any appreciable hardness is silica, which is #7 on Moh's scale. This has been used in primers heretofore in small quantities; because of its tendency to abrade the mill linings, a fine grind was never attempted, and the slightly coarser silica particles were used to give the primer tooth, i. e. a slightly roughened surface so that the next coat would have good adhesion to the primer. Larger quantities were not employed, because of the heightened action on the mill linings, and the apparent lack of utility.

Sand-paper and sanding wheels, used for surfacing, were formerly prepared with silica sand (hardness 7); but the newer wheels employ silicon carbide (carborundum) and aluminum oxide (alundum) which have hardness of approximately 9. When these abrasives come into contact with primers containing the soft pigments commonly used, a very rapid sanding action is obtained, with resultant necessity for touch-up work.

By adding to a primer larger quantities of silica, 2 to 4 pounds per gallon, a primed surface is obtainable which is not abraded by the silica type papers, and resists to a considerable degree the silicon carbide and aluminum oxide types. The use of smaller quantities of aluminum oxide and silicon carbide powders (⅛ pound to 1½ pounds) gives primers which are superior to the silica type primer for use with the harder abrasives, and equal for use with the silica abrasive.

In formulation of primers with these hard pigments, the general principles of primer formulation should be employed. The vehicle should have

good adhesion, and resist lifting by the top coats, without being too hard to prevent adhesion; any of the present vehicles may be employed successfully, except the very soft or very short types. There is a tendency, when the two abrasives in primer and paper meet for the engagement to cause a strain on the vehicle and on the adhesive; if the vehicle is too soft, the abrasive in the primer may tear through the vehicle; if the vehicle is too short, the bond of the abrasive may be better than the bond of the primer.

The common rust-inhibitive and covering pigments may be employed as in ordinary formulation; the hard pigments are inerts, and should replace the softer inerts to a greater or lesser degree. Wherever silica is hard enough, it may be used as the only hard inert; for general use, however, it is preferable to add a harder pigment to resist the action of the harder abrasives.

The use of these harder materials presents a very serious maintenance problem. Even where smaller quantities of silica were used to give tooth, the amount was held at a minimum to reduce the wear on mill facings. To overcome this difficulty which would be very serious with the amounts I use, I prepare my primer with any desired combination of pigment and vehicle, in any type of mill. To the thoroughly ground primer, which has been transferred to a mixer, I add the hard pigment in the form of a very fine dust, using as fine a material as is economically obtainable. The resultant primer is then carefully mixed; and a satisfactory degree of dispersion for primer work can be obtained by this method.

The following examples are typical of my invention:

I. Light brown primer—overnight air dry

Blown linseed oil	pints	1
10 gal. East India gum-wood oil varnish	do	3½
Solvent naphtha	do	1
Petroleum naphtha	do	2½
Black magnetic iron oxide	pounds	¾
Chrome orange	do	3½
Magnesium silicate	do	2

Grind together on stone mill to good B grind, add silica (300 mesh—3#). Run through mill once. The silica in this case is not fine enough to wet thoroughly by merely mixing. The primer has fair resistance to abrasive action.

II. Oxide baking primer

25 gallon wood oil ester gum varnish	pints	5
Heat bodied perilla oil	do	1
VM & P naphtha	do	1
Turpentine substitute naphtha	do	1
Guiacol (anti-oxidant)	ounce	¼
Persian gulf oxide	pounds	1¾
Lamp black	ounces	5
Soft siliceous inert	pound	¾

This is given an A grind in a pebble mill. After grinding, 1 gallon of varnish is mixed with every 5 gallons of primer, and to each gallon of the mixture is added ¼ pound of 600 mesh silicon carbide flour, which wets satisfactorily by merely mixing. This primer is very resistant to the action of sand-paper and sanding wheels; when used as a baking oxide primer under surfacer on automobile bodies it reduces cutting through to the metal to a negligible factor.

III.—A primer made exactly like the last, except substituting aluminum oxide powder for the silicon carbide powder, also gives satisfactory results.

While the examples given show only ordinary varnish and oil vehicles, it is possible to formulate these primers with vehicles containing phenol-aldehyde and alkyd type resins, and get excellent results, always bearing in mind that the vehicle should not be soft, or very short.

Better results are obtained in formulation of primers according to my invention, if the total quantity of pigment is kept reasonably low (3–4 pounds per gallon of vehicle); this permits of better anchorage in the vehicle for the hard pigment particles to resist the action of the abrasives.

I know of no common, cheap materials for use as hard pigments in primer other than the products mentioned. The very hard gems (topaz, beryl, diamond, tourmaline, zircon and spinel) with a hardness of 7.5 or higher, could of course be employed with results varying with the hardness; but they are all to expensive for consideration. Any pigment as hard as or harder than the abrasives commonly employed in sanding, would come within the scope of my invention.

The novel priming compositions disclosed here are claimed in my co-pending application Serial #673,107, filed May 26, 1933. I claim herein only the method of preparing the surface, using my novel priming compositions in conjunction with the proper type of abrasive.

Having described my invention, I claim:

1. The method of preparing a surface which consists in applying a primer containing as an essential ingredient silicon carbide, applying over the primer a sanding surfacer, drying the surfacer, and smoothing the surface with an abrasive which will abrade the surfacer without substantially affecting the primer.

2. The method of preparing a surface which consists in applying a primer, containing as an essential ingredient aluminum oxide (alundum), applying over the primer a sanding surfacer, drying the surfacer, and smoothing the surface with an abrasive which will abrade the surfacer without substantially affecting the primer.

3. The method of preparing a surface which consists in applying a primer containing as an essential ingredient a pigment as hard as or harder than silicon carbide (carborundum) and aluminum oxide (alundum), applying over the primer a sanding surfacer, drying the surfacer, and smoothing the surface with an abrasive which will abrade the surfacer without substantially affecting the primer.

DAVID A. BOSLEY, JR.