Patented May 15, 1945 2,375,825

UNITED STATES PATENT OFFICE

2,375,825

POLISHING COMPOSITIONS

Albert Saunders, Maplewood, and Loy S. Engle, Harrington Park, N. J., assignors to Interchemical Corporation, New York, N. Y., a corporation of Ohio

No Drawing. Original application October 16, 1941, Serial No. 415,212. Divided and this application April 19, 1944, Serial No. 531,791

2 Claims. (Cl. 51—308)

This invention relates to polishing compositions and methods particularly useful in the elimination of blemishes in baked resin finishes on automobile bodies and the like. In particular, it relates to the use of certain calcium silicates as polishing agents for this purpose.

In the past, the most common finish for automobile bodies has been a thermoplastic coating such as nitrocellulose lacquer. In order to give such finishes a gloss surface, it is necessary to sand and polish them. While the polishing is an expensive process, it satisfactorily leads to a high gloss surface, probably because the plastic flow of the finish under the heat of polishing eliminates the fine scratches which are necessarily produced by the abrasives used. The blemishes or damaged places which oceur not infrequently in the handling of automobile body parts may easily be repaired and rendered indistinguishable from the remainder of the surface by sanding and polishing the patch in the same way that the whole finish is sanded and polished.

Heat-hardened finishes, in which term we include all those finishes containing resins which are hardened rather than softened by the application of heat and are customarily baked after application to convert the resin to the heat-hardened condition, have the advantage of providing gloss surfaces without sanding or polishing. For this reason, a considerable economy could be introduced by using such finishes instead of thermoplastic finishes on automobile body parts, were it not for the fact that no method of eliminating blemishes in baked resin finishes has been known. Consequently, when baked resin finishes are used, any body part containing a blemish caused by scratching or chipping in handling must be completely refinished. This eliminates the economies which would otherwise be present in the use of baked resin finishes.

The difficulty in patching baked resin finishes arises from the fact that, no matter how smooth the surface of the patch and the surface of the main body of the finish may be, the outline of the patch is clearly visible owing to the absence of a polishing operation on the non-patched parts of the automobile body which would blend the patch with the main body of the finish as in the case of thermoplastic finishes. Attempts to eliminate the line of demarcation in patched baked resin finishes by a polishing operation have proved unsuccessful, for the fine scratches formed by fine abrasive polishes are not eliminated by plastic flow as in the case of thermoplastic finishes, and the polishing, therefore, leaves a slightly hazy appearance differing from the gloss appearance of the smooth unpolished surface of the main body of the finish. It has, heretofore, proved impossible to make the patch invisible.

However, the difference in appearance between polished and unpolished areas of a baked resin finish may be eliminated without completely eliminating the fine scratches caused by abrasive polishing material. The hazy appearance of the polished areas arises not merely from the presence of fine scratches, but from the presence of debris or minute particles and shavings of the baked resin contained in the scratches. It is this debris which scatters incident light and gives the appearance of haze. It is possible to eliminate the debris or shavings from the scratches, and thus to produce a finely scratched area which does not differ in appearance from the unscratched and unpolished gloss areas of the surface by flocculating the debris into agglomerations with the abrasive, which can be rubbed from the surface. This method of polishing forms the subject matter of a co-pending application of one of the co-inventors here with others, Serial Number 393,934, filed May 17, 1941.

As disclosed in the above application, comparatively few of the fine abrasive powders which are used as polishing agents have the property of flocculating with particles of baked resin. Those which have this property may be selected and identified by the following test:

The abrasive powder to be tested is mixed with fragments (or a powder) of the resin of which the surface to be polished is made (or a resinous material substantially identical therewith), and the mixture is wet with the liquid to be used as the vehicle in applying the abrasive powder. Ordinarily, water is the most practical vehicle. The mixture is then observed through a microscope using a magnification of from 75 to 150 diameters. In case the particles of the mixture are seen to form agglomerations in the liquid, the abrasive powder is shown to have the property of flocculating with the baked resin particles in the liquid. With respect to non-aqueous vehicles, the abrasive particles might acquire, on preliminary mixing, an electrical charge opposite to that of the resin fragments, with consequent agglomeration of the materials. The materials may be redispersed by rubbing the particles unless the redispersion is opposed by the phenomenon of flocculation mentioned above. This agglomeration due to electrical (or static) charges must not be confused with the true flocculation phenomenon, as the former is not a

measure of the ability of the abrasive to remove the debris from the surface grooves. Of course, an aqueous vehicle is generally a sufficiently good electrical conductor to prevent accumulation of these static charges.

The principal difficulty encountered with the best polishing agents described in the above-identified patent application has been lack of stability on storage in a vehicle. The polishing agents tend to react in aqueous media, to produce materials which can no longer be successfully used in polishing.

Another difficulty frequently encountered with these polishing agents has been dusting of the polish on the buffing wheels, apparently due to too rapid drying of the aqueous vehicle.

This invention provides an inexpensive polishing composition which is stable on storage, and which at the same time will remove the haze from non-thermoplastic resinous finishes quickly. The composition includes a new abrasive material stable on storage in aqueous systems, and in its preferred form it is combined with certain water-miscible vehicles. The abrasive powder which contributes to the superior qualities of this polishing composition is an alkaline-reacting, precipitated, hydrated, calcium silicate. Preferably, the calcium silicate is in finely divided form (average particle size under 1 micron). A typical product of this type is available in the market under the trade name "Silene," and is manufactured by the Pittsburgh Plate Glass Company. This product has an approximate analysis of:

	Per cent by weight
CaO	18.00
SiO_2	64.00
H_2O (loss at 105° C.)	4.00
Loss on ignition	14.00
NaCl	.35

Other properties are:

pH in water suspension	10.10
Specific gravity	2.25
Bulk density (powder) lbs./cu. ft.	15 to 16
Refractive index	1.463

"Silene" exhibits the flocculation with fragments of non-thermoplastic resins which is characteristic of abrasive powders capable of polishing these resinous finishes, when subjected to the flocculation test described above; but unlike hitherto available abrasive powders capable of producing optimum gloss, or freedom from haze, mixtures of "Silene" with aqueous vehicles maintain their polishing properties on prolonged standing.

Furthermore, results superior to any obtained with heretofore known polishing compositions can be obtained if the vehicle in which the "Silene" is to be used is selected from a small and special group. The vehicles which have been found to yield superior polishing compositions with "Silene," and hence are included in this invention, are ethylene glycol, formamid and glycerol, and they are preferred in the order given Although these three vehicles may be used undiluted with the "Silene" it is more economical to add water to the composition, and in some cases the presence of water is beneficial.

The proportion of "Silene" to vehicle is not critical, the criterion being that of obtaining a smooth, easily workable paste. The compositions were tested by rubbing various resinous surfaces, such as phenol-formaldehyde, urea-alkyd, oleoresinous and alkyd, which had been dulled by rubbing with a fine abrasive, followed by rubbing with McAleer's polish. The latter polish reduced the dullness left by the abrasive, but the resinous surfaces were still hazy or semi-matte in appearance. After cleaning the surface with a hydrocarbon solvent to remove wax, they were rubbed with typical compositions made in accordance with this invention until a highly glossy surface free from haze and exhibiting no visual difference from the rest of the finish was produced. These compositions are described in the following examples.

Example 1

A polishing composition was made by mixing—

	Parts by weight
Ethylene glycol	75
"Silene"	33

Water may be added if desired, but this composition produced the haze-free gloss with least rubbing or labor without dilution.

Example 2

The polishing composition consisted of—

	Parts by weight
Formamid	25.0
Water	25.0
"Silene"	22.5

This polish produced the desired gloss with the least labor and in the least time of all of the polishes, when used on a urea-alkyd resin baked finish, but it was not as satisfactory as the composition of Example 1 when used on other resinous surfaces.

Example 3

The polishing composition consisted of—

	Parts by weight
Glycerol	37.5
Water	12.5
"Silene"	23.0

This polish quickly removed the haze from the resinous surfaces, but it was not quite as efficient as the polish of Example 1.

The "Silene" was tried with numerous other vehicles and combinations of vehicles, and with nearly all of them results were obtained which were superior to those obtainable with other abrasives or powders in the same vehicles In particular, the "Silene" could be successfully used with waxes wherein the vehicle was in the form of an emulsion, without the loss of polishing power which is characteristic of other powders in the presence of waxes or oils. However, water or a water-miscible liquid must be present in the vehicle in order to obtain satisfactory results. Of all of the vehicles tried, three compounds gave polishing compositions with the "Silene" which were outstanding in their ability to produce haze-free surfaces with a minimum of rubbing. These vehicles, which are illustrated in the examples, are ethylene glycol, formamid and glycerol.

This application is a division of our co-pending U. S. Application Serial No. 415,212, filed October 16, 1941.

We claim:

1. A polishing composition characterized by its ability to produce a haze-free, glossy surface on non-thermoplastic resinous finishes, which comprises a vehicle containing essentially a liquid polyhydric alcohol of the group consisting

of glycerol and ethylene glycol, and a polishing abrasive dispersed in the liquid consisting essentially of a hydrated calcium silicate powder containing about 18% by weight CaO, 64% by weight SiO_2, and 14% by weight chemically combined water.

2. A polishing composition characterized by its ability to produce a haze-free, glossy surface on non-thermoplastic resinous finishes, which comprises a vehicle containing essentially a liquid consisting of ethylene glycol, and a polishing abrasive dispersed in the liquid consisting essentilaly of a hydrated calcium silicate powder containing about 18% by weight CaO, 64% by weight SiO_2, and 14% by weight chemically combined water.

ALBERT SAUNDERS.
LOY S. ENGLE.