Special Circular

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Scientific Section
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WASHINGTON, D. C.

— Odds and Ends —

RECENT DEVELOPMENTS *in the* PAINT INDUSTRY WHICH MAY HAVE A BEARING UPON YOUR FUTURE PRODUCTION

By Henry A. Gardner

Industrial Finishes	Metal Protectives
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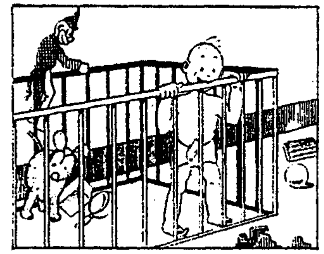
in this direction. When properly made, they have great ease of application, so that surfaces may be covered quickly with the minimum of labor. This, together with their speed of drying, offers very interesting possibilities for interiors of homes, apartment houses, hotels, and similar buildings.

The use of alkyd emulsions for certain exterior surfaces seems to have been worked out. Fundamentally, the proper emulsion of the proper type of alkyd should give desirable finishes for this purpose on certain types of surfaces. Other factors, such as the particular surface, pigmentation, and method of application, all play a part. There is every reason to believe, however, that these paints, when properly developed, will prove very useful for stucco, concrete, cinder block, and brick. It is probable that a fairly wide use of such materials may ultimately develop in Florida, California and other sections of the country where stucco dwellings are most prevalent. In southern Florida and certain other localities where high temperatures and humidities prevail, surfaces coated with this type of finish may occasionally show some mildewing unless the paint contains small percentages of mildew preventives. This is probably due to the fact that the pigments used in such paints are wholly of the titanium or zinc sulphide types. White lead and zinc oxide have never been applied in such finishes because these pigments tend to break the emulsion. The writer has been able to experimentally prevent this type of livering by first treating the lead or zinc pigments with an over-coating which seems to protect them from this reaction, but tests have not yet been completed with them and their use is not to be recommended at this time. With the idea of preventing early chalking and mildewing, he recently applied to a brick dwelling, finishes made with four different pigment combinations. These comprised titanium pigments —titanium pigments and antimony oxide—titanium pigments and treated oxide—and phthalated titanium pigments. Information will be obtained from the exposure test referred to above, regarding the comparative durability of the various pigmented mixtures. Ultimately, the pigment producer will make available pigments which are easily wetted and which may be surface-treated to prevent reactions. Such pigments will be specially designed for use with alkyd emulsions.



Non-Poisonous Colors. There is relatively little danger of poisoning from paints on toys and nursery furniture, as both the paint manufacturer and the toy manufacturer are familiar with the types of non-poisonous pigments to use. The danger lies with the householder. He may have a crib which needs repainting, and may use some old paint around the house, regarding which he has no information, or he may go to the paint store and buy a can of vivid yellow enamel made with chromates—and chromates, by the way, may be as toxic as lead compounds. In other words, it is probable that in all cases where children have been poisoned by eating the paint from a crib or other article, the poison has come from paint applied by the householder rather than paint applied by the manufacturer. Paint is not a substance which people eat, and the householder is usually exposed to many more serious dangers. For instance, he may sprinkle kitchen lye on food, mistaking it for salt, or he may use borax instead of boric acid in his eyes, or in place of argyrol he may use iodine which is about the same color. There is little lead poisoning today because of the sanitary precautions taken in factories where white lead is manufactured, and because of the reasonable care of the painter in using lead paints. But there are places, such as on toys, where lead compounds should not be used. It may therefore be of interest to indicate that titanium oxide whites are the safest opaque non-soluble colors to employ. It is probable that zinc sulphide pigments are also relatively innocuous. In making bright colors for toys at this laboratory, 20 parts of a titanium-barium base pigment was tinted with only one part of the following colors to produce very bright tints which would be suitable for use upon toys:

Red. This was produced with *lithol toner.*

Green. This was produced with *tungstated organic green toner.*

Blue. This was produced with *tungstated organic blue toner.*

Blue. This was produced with *Prussian blue.*

Orange. This was produced with a mixture of *medium lithol toner and Hansa yellow.*

Yellow. This was produced with *Hansa yellow G.*

For spirit-resin stains, the non-toxic F. D. I. foodstuff colors are sometimes applicable in colouring toys if a transparent coloring is desired.

In connection with methods of determining the toxicity of pigments by feeding animals with pigments for substantial periods of time and then examining and weighing the excreta and noting the physical condition of the animals, see Scientific Section Circular No. 199.

Lacquer Developments. If nitrocellulose is warmed and then applied with spray guns which have thermostatically controlled heating units or with ordinary spray guns having special hose to handle lacquer which has been heated to a temperature of not over 150° F., it is possible to apply total solids of considerably higher concentration. Electric heaters for the lacquer containers, or oil baths surrounding the fluid coils that feed the hose for the spray gun, have been experimented with. Hot water baths with equipment to maintain the desired temperature have also been used. It is understood that a few automobiles have been finished by this method, with satisfactory results, and that considerable experimental work is being carried out in this direction. If the process should finally prove satisfactory, it should eliminate one of the chief objections to lacquer, namely, lower total solid content than can be obtained with some other types of coatings. If carefully controlled, the operation might also be feasible for dipping purposes.

Emulsified nitrocellulose lacquers also appear to be undergoing interesting developments. Such emulsions are relatively non-flammable, thus reducing fire hazards in shipping and storage. They are non-penetrating in character and therefore are suitable for use upon paper cartons, fabric and the like, when a depth of coating is desired on the surface. It is understood that one typical fruit package manufacturer last year consumed over 50,000 gallons of lacquer in coating one type

of package. Such lacquers, of course, should be shipped in glass containers because of their corrosive effect upon iron or steel drums, and a small amount of acetone or alcohol should be included in their composition to prevent freezing. There are two types of lacquer emulsions—lacquer in water and water in lacquer. In the former the water is the outer phase and the viscosity of the nitrocellulose used has little or no effect upon the viscosity of the resulting emulsion. In view of this, the limiting factor of the total amount of solids obtainable in an emulsion would be the practical impossibility of emulsifying extremely viscous or paste-like nitrocellulose solutions. However, with low viscosity cottons, workable emulsions of 35 to 40 percent nitrocellulose may be obtained. The water solubility of the solvents used in such lacquers should be the lowest that it is possible to obtain. The solvents and diluents should also be so proportioned as to allow uninterrupted evaporation of the water during drying. One portion of the solvent should have a lower evaporation rate than that of water, in order to keep the cotton in solution near the end point of drying. The emulsifying agents used should act also as stabilizers and should have no deleterious effect upon the final film. Certain resins lend themselves better to emulsification in such compounds than do others. Water wet pigment pastes can be used to advantage and excellent dispersions obtained. Water wet nitrocellulose can also be used.

Ethyl cellulose is a white solid resembling cellulose acetate in its resistance to flame. It is quite compatible with many film-forming materials. Being an ether, it is more resistant to acids and alkalis. It is soluble in practically all solvents which are employed for either cellulose nitrate, cellulose acetate, or mixed cellulose ethers, or chlorinated rubber. It is insoluble in petroleum naphthas, polyhydric alcohols, and certain esters of high molecular weight fatty acids. It has a wider solubility than most other commercially available quick film-forming materials of the cellulose type. Films of ethyl cellulose exhibit very great flexibility and toughness, as well as high tensile strength, when compounded with the proper type of plasticizer. Even in low percentages, ethyl cellulose adds a remarkable degree of flexibility to hard resins, both natural and synthetic. Spirit varnishes like dammar may be made flexible and possibly more moisture resistant by the addition of from 5 to 20 percent of ethyl cellulose. Ethyl-