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NITROCELLULOSE LACQUER

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This invention relates to improvement in nitrocellulose lacquers, and more particularly to that type of lacquer known to the trade as "flat lacquer", used particularly in the furniture finishing industry.

The history of flat lacquer is unique. Formerly all furniture was finished with varnish—the wood was stained, filled, shellacked and varnished, the varnish being rubbed with pumice stone and oil to give the dull finish desired by all first class furniture manufacturers. This was a slow and laborious process, as coatings were dried from eight to twenty-four hours before recoating, and it was necessary to dry the last coat at least twenty-four to forty-eight hours before rubbing. The first improvement came in the so-called "flat" varnish. This was made by adding a transparent pigment (asbestine, clay, magnesia, insoluble metallic stearates and palmitates) to the varnish. This gave the dull sheen without rubbing.

When nitrocellulose lacquers invaded the finishing field, the use of flatting agents in clear varnish was extended to lacquer. It was found that the agents that flatted varnish flatted lacquer; and everybody was satisfied temporarily.

It was soon found, however, that the flatting agents in use were not satisfactory. All inorganic pigments were of necessity present in such small quantity as to present a very serious settling and caking problem. Furthermore, they were not as transparent in lacquer as in varnish, and left a gray film. This practically eliminated them from consideration, leaving only the metallic soaps.

The metallic soaps had the advantage of clarity and good flatting with ony a small percentage of soap, furthermore, they stayed in suspension—a property to be desired. Metallic soaps are still used by a majority of lacquer manufacturers: but there is a very serious drawback to their use by a manufacturer who desires to supply a durable finish.

The action of sunlight has a peculiar effect on most soaps. It renders them susceptible to the action of water. When a "soap flat" lacquer is first made, the soap acts as a waterproofer in the film. After it has been exposed to ultra-violet light, however, the soap breaks down, and actually absorbs water into the film. The result is, that in severe cases, the furniture turns white due to this absorption of moisture, and the reputable lacquer manufacturer must stand the cost of correcting this complaint.

Since this condition develops gradually over a period of two or three years it can readily be seen that it was not discovered until some time after the flat lacquers made with metallic soaps were placed on the market.

The first thought was to use "waterproof" soap. To this end, the acids of wood oil were freely employed, with the idea of producing a soap that would be waterproof even after action of the sunlight. Uniformly all results were failures from the start; the films obtained with tungates had a blue haze which could not be overcome.

This being out of the question, most manufacturers went back to the stearate and palmitate flats, the condition not being serious from their point of view, as they refused to be responsible for the finish after two or three years (and practically no failures occurred before such a time). The others went on to experiment with waxy gums such as East India batu, etc., and several produced such a flat lacquer. This was an excellent flat lacquer and is still in use but does not give uniform finishing results, even with the same drum of lacquer because the flatting varies with the temperature, drying conditions, etc.

The next type of flat lacquer was the wax flat. In this type of lacquer an insoluble wax was used to produce the flatting properties. The wax flat is a very clear, hard lacquer, but it also has a very objectionable feature. The wax breaks up the continuity of the film, and a short flat lacquer is obtained. Over shellac, this is actually brittle. This objection, together with lack of uniformity of raw material, difficulty of grinding, and other manufacturing difficulties, led us to re-investigate the waterproof soap type of flat lacquer.

The blue haze referred to above persisted until we prepared our own tungates, according to the method outlined in the co-pending

applications of Henry D. Heiser and Milton Zucker #507,520. The haze was due to free wood oil, in our estimation, and we attribute failure of all former workers with this product to this impurity.

On further investigation we have found that serious manufacturing difficulties may be encountered with the use of this metallic tungate, unless the soluble salts of zinc or other heavy metals, and sodium, are removed very carefully. These show themselves up as dirt in the lacquer; and may cause serious trouble if not eliminated.

In the main, we have discovered that a neutral zinc tungate, free of excess wood oil or wood oil acids, and preferably separated from metallic salts, will act as an excellent flatting agent for nitrocellulose lacquer. The resultant film is clear, similar to films produced with other soaps; it has no haze due to free oil; it will resist the action of ultra violet light, and has the normal life of an inside protective coating of considerably more than two or three years.

Preferably zinc tungate, described in the co-pending application of Henry D. Heiser and Milton Zucker (above mentioned) in a finely divided state, is added to a solution of nitrocellulose. We do not, however, limit ourselves to the use of such a paste, it being merely the most desirable method of adding the zinc tungate. The neutral zinc tungate may also be precipitated, washed, and very carefully dried by heat (extreme care must be taken to avoid decomposition); and then ground in a stone, roller, or pebble mill with castor oil, ester gum solution, dibutyl phthalate or nitrocellulose solution, as the formulator desires. While this method is not as good as the first, if extreme care is taken there will be little or no haze.

The tungate may be used alone, or with other flatting agents. It may be used to flatten any clear nitrocellulose lacquer, where it is desired to obtain the rubbed effect without rubbing. Furthermore, it has another distinct advantage. Some finishing shops want different sheens on different parts of the furniture; they use one lacquer, and rub to the desired sheen. Tungate flats stand this rubbing very nicely.

The clear lacquers may be nitrocellulose solutions in any lacquer solvents, with or without the addition of plasticizers such as castor oil, rapeseed oil, dibutyl phthalate, etc., or gums such as ester, damar, elemi, synthetic amberols and glyptals, etc., in fact, any clear lacquer may be flatted with metallic tungate. Zinc tungate is perhaps the best soap, but aluminum, calcium and magnesium tungates may also be used.

Having thus described our invention, what we claim is:

1. A flat nitrocellulose lacquer composed of a clear nitrocellulose lacquer and a neutral metallic tungate.

2. A flat nitrocellulose lacquer composed of a clear nitrocellulose lacquer and a neutral zinc tungate.

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