

UNITED STATES PATENT OFFICE

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POLISHING

No Drawing.

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This invention relates to the polishing of articles, and more particularly to the polishing of articles by the tumbling-barrel method or the equivalent. While not confined in its application thereto, it is particularly advantageous in connection with the polishing of articles having relatively soft surfaces as compared to metallic articles, such as articles of cellulose ester plastic (e. g. cellulose nitrate and/or cellulose acetate plastic), casein, synthetic resin, vegetable ivory, and the like.

In the polishing of articles of the general character indicated, it is desirable to tumble them in the presence of a mild abrasive, such for example as kieselguhr, a carrier for the abrasive, such for example, as small elements of wood to which the abrasive can be adhered, and a species of adhesive for adhering the abrasive to the carriers, such for example as wax. In this method of polishing there is, unless the same be corrected, the difficulty that the adhesive adheres to the articles being polished, so that, when the articles are discharged from the tumbling barrel they carry a cloud of material which dulls the luster and which must be removed from the articles by an operation additional to the tumbling; and such an additional operation, of course, adds to the cost of the articles in handling expense, factory equipment and production time. Furthermore, even when the cloud has been removed, the articles do not yet have the high finish which should result from a polishing operation.

I have devised a method of the general character indicated which not only provides for a generally tumbling operation but, furthermore and particularly, provides that the articles, when discharged from the tumbling barrel, will not only be free from the undesirable clouding but also will have that high gloss which should result from fine polishing.

One object of the invention is to provide a polishing method whereby articles may be polished rapidly and at low cost. A further object is to provide a method whereby the articles will be produced free from cloud and with a proper gloss. A further object is to provide suitable solutions or mixtures for associating the abrasive to be used for polish-

ing, with the articles to be polished and with whatsoever carriers may be used for the abrasive. To these ends, and also to improve generally upon methods and solutions of the general character indicated, my invention consists in the various matters hereinafter described and claimed.

In general, my invention comprises tumbling the articles to be polished in a tumbling barrel, together with abrasive, carriers for the abrasive, and a medium for associating the abrasive with the carriers and the articles. As a particular feature, the invention comprises cooling the articles to room temperature somewhat prior to the completion of the tumbling, and while they are yet contained in the barrel and closely associated with the abrasive and the "medium", thus to dissipate the heat generated during the tumbling; and continuing the tumbling action for a short time while they are cool. I have found that this cooling in some manner overcomes and eliminates the objectionable clouding, and the final tumbling burnishes the articles.

I now proceed to a detailed description of the invention, it being understood that such description is given by way of example merely, and not by way of limitation, and it being further understood that details such as proportions of ingredients in the solution, relation of the number of articles to the amount of carrying agent, amount of solution, times and temperatures of operation, and all such factors, may be widely varied to meet particular conditions of surface, size of articles, etc., without departure from the fundamentals of the invention.

Assuming that the articles to be polished are to be tooth brush handles of pyroxylin plastic, I provide for each two bushels of tooth brush handles, two bushels of carrier devices of small size (conveniently hard wood shoe pegs which are of rectangular cross section and about $\frac{1}{2}$ " long by $\frac{1}{8}$ " thick and $\frac{1}{4}$ " wide), seven ounces of a solution of what I for convenience term an "adherent" or "associating medium", and one ounce of kieselguhr. The adherent solution may desirably be (parts by weight), yellow beeswax 12, 100

shellac wax 2, bleached beeswax 2, and turpentine 38. For the turpentine, which serves merely as a solvent for the wax, may be substituted an equivalent such as toluol or other substances which will readily suggest themselves to those familiar with the art of dissolving wax. If desired, camphor in small amount may be added, or substituted in part for the turpentine, as a possible aid in the drying which occurs in the cooling step referred to briefly above and to be hereafter described in detail. The shellac wax is also an aid in the drying. The mixture is heated to dissolve the wax, say to 150° F., the kieselguhr stirred in, and the mixture kept hot to insure the continued solution of the wax.

Preferably prior to the mixing of the articles with the shoe pegs, the shoe pegs are thoroughly sprinkled with the mixture of wax solution and kieselguhr, although obviously, the solution, the pegs, the articles, and the kieselguhr may be mixed in any order desired, the order of mixing having no primary relation to the invention. The complete mixture is now tumbled in a horizontal tumbling barrel, the barrel being desirably polygonal, say hexagonal, in cross section and of such size (say two and one-half feet in diameter by three feet long) that the mixture does not fill the same over one-half or two-thirds full. The rotation speed may, under ordinary circumstances, be from 30 to 40 revolutions per minute, and the time from 9 to 12 hours. Obviously these factors depend upon the particular articles, etc., and will be varied as circumstances require, by the particular operator to obtain maximum benefits. As in the usual tumbling barrel, the same is provided with a side opening (say of about two square feet) for the introduction and removal of the articles, such opening having a closed cover; but I also provide a screen cover for use in conjunction with the cooling and drying operation now to be described.

Somewhat prior, say one hour prior, to the end time of the tumbling operation, the tumbling is temporarily discontinued, the ordinary closure of the barrel removed, and the screen cover substituted; and then the tumbling operation is resumed for the remainder of the tumbling time. Upon the removal of the usual cover, at the temporary discontinuing of the tumbling, it will be found that the interior temperature of the barrel is high, say 150° F., due, apparently, to the internal friction of the mass (and a raised temperature is desirable during the primary tumbling).

In particular accordance with my invention, I have found that the cooling of the mass and a short continued tumbling, as already indicated will result in the abolishing of the objectionable clouding before mentioned, and will give the high gloss not be-

fore procurable. The rotation of the barrel, and the consequent shifting of the mass brings about an air pumping action in the barrel which effectively cools the contents and, in a species of drying action removes solvent vapors such as turpentine. Just what the ratio of primary tumbling to secondary tumbling should be, will, obviously depend on particular circumstances; the general rule is that the cooling and drying tumbling should be carried on long enough to remove the clouding and give the desired burnishing. Under ordinary circumstances and for goods of the type indicated, in a total tumbling of 12 hours, the second tumbling may be about 1 hour.

In explanation of the action occurring in the cooling step, I may say that, so far as appears, when the mass cools, giving the adherent a tendency to precipitate, and the solvent vapors are removed from the barrel, the adherent which is present on the articles in the form of a cloud, or may be as distinct particles, assumes such a condition that as the tumbling continues the carriers, or shoe pegs, are able to remove the adherent from the articles. It may be, also, that the cooling and drying so effect the adherent, both that on the articles and that on the carriers, that the tendency of the adherent to adhere to the carriers, as distinguished from the articles, is enhanced. In any case, the ultimate result is that the adherent becomes entirely removable from the articles in the final tumbling.

Furthermore, with the adherent removed from the articles and, it may be assumed, re-disposed upon the carriers, the carriers and kieselguhr are in ideal condition for exerting a delicate burnishing action on the goods, having in consideration the fact that the previous tumbling has smoothed the surface of the goods to such a condition that burnishing is a practical possibility.

As will be understood by those skilled in the art, additional solution, either containing wax or not as circumstances require, may be supplied to the shoe pegs, either during the tumbling operation, or between the use of the pegs for one tumbling operation, and another tumbling operation on another load of articles. There is practically no loss of wax or kieselguhr from the mass; and obviously there is no loss of pegs since the screen of the barrel is sufficiently small mesh to insure the retaining of the mass in the barrel during the tumbling.

I claim:—

1. In the polishing of articles, the method which comprises: tumbling the articles in the presence of an abrasive, carriers for the abrasive, and a heated mixture of an adherent for associating the abrasive and the carriers, and a liquid carrier for the adherent, such tumbling being continued until the polishing

is substantially completed, and then cooling the mass and continuing the tumbling for a short time with the mass cooled.

2. In the polishing of articles, the method which comprises:—tumbling the articles in a closed tumbling barrel in the presence of an abrasive, carriers for the abrasive, and wax and a solvent therefor, such tumbling being continued until the polishing is substantially completed, opening the barrel and screening the barrel thereby to provide for cooling of the mass, and continuing the tumbling for a short time with the barrel screened and the contents cooled.

3. In the polishing of articles, the method which comprises:—tumbling the articles in the presence of abrasive carriers and a heated mixture including (a) a solution comprising a waxy constituent and a solvent therefor in substantially the proportions 16:38, and (b) an abrasive, the proportion of abrasive to solution being substantially 1:7, such tumbling being continued until the polishing is substantially completed, and then cooling the mass and continuing the tumbling for a short time with the mass cooled.

4. In the polishing of articles, the method which comprises:—tumbling the articles in the presence of abrasive carriers, and a heated mixture including (a) a solution comprising, in parts-by-weight proportion, yellow beeswax 12, shellac wax 2, bleached beeswax 2, and a compound of the class comprising toluol and turpentine 38, and (b) kieselguhr, the proportion of kieselguhr to solution being substantially 1:7, such tumbling being continued until the polishing is substantially completed, and then cooling the mass and continuing the tumbling for a short time with the mass cooled.

In testimony whereof, I affix my signature.
FREDERICK LACH.