UNITED STATES PATENT OFFICE.

HERMAN G. SCHANCHE, OF PHILADELPHIA, PENNSYLVANIA, AND FRANKE STUART HAVENS, OF HARTFORD, CONNECTICUT, ASSIGNORS TO HARRISON BROS. & CO., INC., OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

MANUFACTURE OF RESIN SOAP.

1,017,692. Specification of Letters Patent. Patented Feb. 20, 1912.

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To all whom it may concern:

Be it known that we, HERMAN G. SCHANCHE, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, and FRANKE STUART HAVENS, of Hartford, in the county of Hartford and State of Connecticut, the present post-office address of both being Thirty-fifth and Gray's Ferry road, Philadelphia aforesaid, have invented a certain new and useful Improvement in the Manufacture of Resin Soap, whereof the following is a specification.

Our invention relates to the manufacture of the so-called resin soap which is employed as the foundation of size for making paper, or analogous products, and its object is to so conduct the preparation of an acid resin soap as to permit the control of its physical condition, as well as its chemical constitution, the desiderata being to obtain the products in a substantially desiccated state, admitting of a high degree of comminution, and to preserve uniformity and definite composition, so that when the soluble portion is dissolved in water, the free resin shall be completely diffused in the condition desired for uniform incorporation into the fiber of the paper, or similar material.

Resin soap, as known in the arts, is primarily a resinate of soda, usually carrying indefinite quantities of uncombined resin, or uncombined soda, or both, and ordinarily existing or used in aqueous solution.

In order to distinguish our process from those commercially practiced, or suggested in the literature of the art, the following explanation is proper:—

Commercially, the most usual method employed for the manufacture of resin soap is conducted in what may be termed the "wet way", that is to say, the alkaline ingredients are added in a state of true aqueous solution, water being present in such quantity as to initially obtain the resin soap itself in the form of an aqueous solution. This process varies from the crude hap-hazard methods employed in many paper mills, where the ingredients are simply boiled together and used upon the spot, to the more definite processes where it has been attempted to prepare the resinate of soda in a more or less concentrated aqueous solution intended to be subsequently reduced by the addition of water when about to be used. It has also been attempted to evaporate a resin soap, initially obtained in a form of solution, down to dryness so as to obtain a hard residuum. Processes have also been suggested for the manufacture of resin soap, consisting of the melting together of resin and an excess of alkali, the latter being in a dry condition, the intention being to obtain a product distinctly alkaline in its chemical constitution and soluble in cold water. We have discovered that by adding to an excess of melted resin, the alkaline ingredient combined with water in quantity only sufficient to effect diffusion, and to prevent undue segregation of the alkali, and not sufficient to initially form a solution of the resin soap, the water will disappear during the re-action itself, and at a temperature which may be but slightly in excess of the melting point of the resin, say 170 or 180 degrees Fahrenheit, at which temperature practically no injurious re-action or partial decomposition is likely to occur, and that we can thus obtain a thoroughly uniform and definite acid soap in a state of substantial desiccation. The product can subsequently be reduced by grinding to any desired degree of comminution. We are thus enabled to obtain an acid resin soap in the physical condition best adapted for shipment as an article of manufacture, and to definitely control its chemical constitution, so that the user can convert it into size of any desired strength, by the addition of known quantities of water.

In the conduct of our process we proceed as follows:—By the application of properly controlled heat, we melt the resinous ingredient, preferably rosin, either in its natural condition, or purified by any available process, the temperature being preferably maintained at a point not substantially exceeding 180 degrees Fahrenheit. To an excess of rosin thus melted, we add the alkaline ingredient, which latter may be crystalline carbonate of soda, or soda ash.

As a typical formula for use with one hundred pounds of rosin in its natural condition, we preferably employ thirty-two pounds of crystalline carbonate of soda, adding the latter gradually in a ground or comminuted condition, and stirring the melted mass until the reaction is complete. The mass will solidify by cooling, as distinguished from positive evaporation, and will

be found to be in a substantially desiccated state, which permits its physical reduction into the form of powder or of lumps of such size as may be desired. The product is an acid resin soap, which is not entirely soluble in water, but which has the characteristics that its saponified portion is soluble, and that the free resin carried thereby consists of minute particles so uniformly distributed as to be properly diffused in suspension when water is added, thus affording the properties best adapted for its ultimate use.

Referring now to the reaction which has taken place, it will be noted that the crystalline carbonate of soda itself carries a certain percentage of water,—that is to say, of the thirty-two pounds added, water constitutes about twenty pounds, and soda twelve pounds. The presence of this amount of water is sufficient to cause proper diffusion, and prevent segregation of the soda.

When soda ash is employed as the alkaline ingredient, instead of the crystalline carbonate of soda, an amount of water not substantially greater than that carried by the equivalent amount of crystalline carbonate, should be employed as a vehicle to effect diffusion of the soda ash and prevent the segregation thereof. Thus, if twelve pounds of dry soda ash be employed with one hundred pounds of melted resin, the addition of twenty pounds of water to the dry soda ash, would substantially reproduce the conditions existing when the crystalline carbonate of soda is used. The method of procedure in the case of the moistened soda ash is similar to that just described for the crystalline carbonate, and the result of the two processes is substantially identical.

As a possible explanation between a process conducted in the wet way and our process, which is conducted in the presence of a permissible amount of water, but without forming a solution of the resin soap, we suggest that in the latter case, the water may act merely by "hydrolysis," without ever becoming a solvent of the resultant product. Whether this explanation be correct or not, we have found that as conducted by us, the direct product is a liquid or semi-liquid mass, whose physical condition is due to liquefaction by heat, as distinguished from an aqueous solution, and that either the water substantially disappears as a direct incident to the so-called saponifying process, or, if retained to any extent, does not injuriously modify the true desiccated character of the soap, since the final stage of our process, (*i. e.* that in which it passes from the liquid or semi-liquid state into a solid form), is not dependent upon evaporation, but is substantially only a cooling process. We term this resultant condition of the product "inherently desiccated," in order to distinguish it from that condition which obtains when the resin soap is first formed as a solution, and is afterward sought to be dried by an evaporating process.

Distinguishing between our process and those of the other type above mentioned, which were not technically conducted in the "wet way," we state that the melting together of the ingredients with the alkali in a true dry condition, tends to produce segregation, so that the product is not a uniform one, and furthermore, so far as we are aware, such processes have been addressed to the formation of an alkaline resin soap which is not properly available for the uses for which our product is intended. We therefore desire it to be understood that we do not claim the manufacture of resin soap as a true solution, and the subsequent evaporation thereof to dryness, nor do we claim the manufacture of alkaline resin soap by the melting of an excess of alkali together with resin, since none of these processes involve the essential principle of ours, and since the products are markedly different from ours in those particulars, which have been pointed out as the desiderata in the production of desiccated resin soap, as an article of manufacture.

Having thus described our invention, we claim:—

1. The process of manufacturing a desiccated acid resin soap, which consists in adding to an excess of melted resin, soda combined with an amount of water sufficient to cause diffusion and prevent undue segregation of the soda, but not sufficient to effect solution of the entire mass and not substantially exceeding the percentage of water which is contained in crystalline carbonate of soda; and thereby forming an acid resin soap in an initial state of non-aqueous liquefaction; and causing the resultant product to solidify by cooling, substantially as set forth.

2. As a new composition of matter an inherently desiccated acid resin soap in a state of substantial comminution throughout, not entirely soluble in water and containing free resin uniformly diffused throughout its mass.

In testimony whereof, we have hereunto signed our names at Philadelphia Pennsylvania, this ninth day of February 1907.

HERMAN G. SCHANCHE.
FRANKE STUART HAVENS.

Witnesses:
JAMES H. BELL,
E. L. FULLERTON.