UNITED STATES PATENT OFFICE.

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ROSIN-SOAP FOR PAPER-SIZE.

SPECIFICATION forming part of Letters Patent No. 694,728, dated March 4, 1902.

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To all whom it may concern:

Be it known that I, HOWARD F. CHAPPELL, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in the Manufacture of Rosin-Soap for Paper-Size, of which the following is a full, clear, and exact description.

In paper-making the body-size to render the paper non-bibulous generally consists of resinate of aluminium, a gelatinous flocculent precipitate, which is formed in the pulp by contact of some alum compound—*e. g.*, sulfate of aluminium, $Al_2(SO_4)_3$—with resinate of soda. The resinate of soda is obtained by boiling ordinary soda-ash (Na_2CO_3) and common rosin together with a proper volume of water. The rosin-soap thus derived assumes a higher position in the settling-tank because of its lesser specific gravity; but however protracted the settling practice shows a marked though minor percentage of uncombined or but partially combined rosin and soda still associated with the soap as it passes into the pulp for final reaction with the alum. In the presence of the alum such uncombined soda releases its carbonic-acid gas in the pulp. This causes objectionable "frothing" of the charge and besides is most apt to develop "spots" or blow-holes in the web at a later stage as the web passes through the calender-rolls. Uncombined rosin in the size tends to stick and tear the delicate web at the same critical stage. The present invention seeks to minimize these defects. It is based upon the discovery that by subjecting the rosin-soap—*i. e.*, resinate of soda—to prolonged heat without burning at a temperature markedly higher than has been the practice hitherto the uncombined rosin and soda formerly associated with the soap almost wholly disappear. Under the stated condition of heat the remnant of rosin reacts. It becomes chemically a part of the soap and on contact with the alum in the pulp passes over into size, while the associated soda converts into sulfate and disappears in solution along with the main portion of such constituent. Common rosin is a complex body made up of several distinct analogues, and it may very well be that some of these constituents (present in minor percentage) react with the soda-ash only at the higher range of temperature distinctive of the invention. At all events, by carefully evaporating the resinate of soda to dryness the compound thus obtained in desiccated state may later be redissolved and, along with the alum, be used in forming a size that markedly lessens the frothing, spotting, and sticking commonly experienced in usual practice heretofore.

According to approved formula the ingredients and proportions taken are as follows:

Ingredients.	*Quantity.*
Rosin.....pounds..	100
Soda-ash (Na_2CO_3)....pounds..	16
Water.....gallons..	12

The requisite quantity of water is brought to boiling in a steam-jacket kettle, the soda-ash is dissolved therein, and then the rosin, crushed to about hazel-nut size, is gradually added while stirring proceeds. Considerable foaming ensues, due to escape of carbonic-acid gas; but after, *e. g.*, two hours boiling the foaming subsides and the reaction between the main portion of the rosin and of the soda is complete, with soda resinate as the result. The boiling is continued thereafter, so as to evaporate water excess. When the charge becomes thick and sticky, it is transferred to an open pan and there exposed to quite a hot fire, which causes the compound to harden portionwise as a flaky scale. This can be easily scraped off and removed. The scale in semidry state is exposed anew under constant raking to a low fire in a separate vessel. After some three or four hours the finished resinate is taken off and spread out in a thin layer to avoid burning. When cold, the compound sets dry and hard in condition to be easily broken up and pulverized preparatory to shipment. In lieu of separate pans the treatment might proceed in a single pan under careful stirring and control of the heat, an oil or like bath for the pan being used, if found convenient, or, again, some suitable form of rotary drier exposed to a low flame and furnished with an internal screw-stirrer could be resorted to, especially when large masses of the compound are to be dealt with.

Precisely what degree of heat will suffice to

effect the desired reaction between the minor portion of the rosin and of the soda which remain uncombined in the crude soda resinate it is difficult to say. A hot fire at the drying-pan speeds the evaporation, but does not appear to be essential to the reaction. An excess heat would of course burn the charge. Certainly the temperature must be above 212° Fahrenheit, and, having regard for economies of time, might properly range at 230°–300° Fahrenheit. At all events the use of open pans exposed to naked fire or flames will prove quite sufficient, regardless of any niceties of temperature, proper care being taken to scrape out the scale or else to keep it well stirred as it forms, so that no scorching of the product need occur.

Soda resinate, desiccated by heat, as hereinbefore detailed, is found to have a much lower percentage of uncombined rosin and soda present therein than is distinctive of the older forms of such compound, and because of its improved quality serves to relieve the paper-maker from the losses and delays due to frothing at the pulp-engine and to "spotting" and "sticking" at the calender-rolls.

Obviously the details, proportions, and ingredients heretofore given may be varied by persons skilled in the art without essential departure from the invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. As a new article of manufacture, desiccated soda resinate having a minimized proportion of uncombined rosin and soda-ash present therein, substantially as described.

2. The method of making rosin-soap for paper-size which consists in boiling rosin in hot soda-ash solution and, after desired reaction effected, evaporating water excess and finally superheating the charge beyond 212° Fahrenheit, while stirring proceeds so that the finished resinate is derived without scorching, in desiccated state having a minimized proportion of uncombined rosin and soda-ash present therein.

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Witnesses:
JAMES H. PEIRCE,
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