UNITED STATES PATENT OFFICE.

B. C. TILGHMAN, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN HARDENING FATTY SUBSTANCES.

Specification forming part of Letters Patent No. **22,593**, dated January 11, 1859.

To all whom it may concern:

Be it known that I, BENJAMIN C. TILGHMAN, of Philadelphia, Pennsylvania, have invented a new and Improved Method of Hardening Fatty and Oily Substances; and I do hereby declare that the following is a full and exact description thereof.

My invention consists in treating acid and neutral fats and oils by sulphurous acid at elevated temperatures, so as to make them more hard and solid and more suitable for making candles and soap.

I heat the fat in a vessel of copper or enameled cast-iron to 500° Fahrenheit and pass through it rapid currents of sulphurous-acid gas from a perforated pipe during three to five hours. Steam is then blown through the fat until all the sulphurous-acid gas which has been absorbed by the fat is expelled from it. The fat is then cooled and manufactured into common or stearic candles, or into soap, by the known processes of saponification, acidification, distillation, pressing, and molding. The sulphurous-acid gas may be made from sulphuric acid and charcoal or other known means. As the acid gas is more efficient when pure than when mixed with other gases, it is convenient first to make a solution of it in water by Wolf's bottles, or other absorbing apparatus, and then to evolve the pure gas as wanted by heating this solution in a suitable close vessel. The gas, after it has bubbled through the fat, should be absorbed by water and again used; or the gas, contained in a suitable gas-holder, may be pumped through the fat and back to the gas-holder. When the fats treated are acid or partly acid an injurious sulphureted compound is formed during the treatment with sulphurous acid. To prevent this I mix with the fat a soap of copper, containing oxide of copper equal to about one-hundredth of the weight of the fat-acid present. The copper is precipitated during the operation as a sulphuret, which may be reconverted into oxide and again used. The higher the heat and the longer the time used in the operation the greater seems the quantity of oxide of copper needed to destroy the sulphureted compound. I prefer the temperature of about 500° Fahrenheit; but I have also obtained good results in operating at 450° Fahrenheit for six to eight hours, using, when fat-acids are present, one three-hundredth of their weight of oxide of copper; also, in operating at 400° Fahrenheit for fourteen hours, using one six-hundredth oxide of copper; also, at 350° Fahrenheit for thirty hours, using one-thousandth oxide of copper. At still lower temperatures a still longer time is necessary to obtain the greatest degree of hardness. If the proper time be much exceeded, a less hard product is obtained. Acid or partly acid fats are less colored in operating at the lower temperatures.

The copper-soap is made by dissolving oxide of copper in five or six times its weight of fat-acids, and it is to be used in quantities proportionate to its contents of oxide of copper, as determined by analysis. I have also operated at 550° Fahrenheit for one and one-half hour, and have also distilled fat-acids in a current of sulphurous-acid gas, and have obtained hardened products; but I prefer the temperature of 500° Fahrenheit.

In operating upon neutral and acid fats in close vessels, with gas at a pressure of several atmospheres, I have found the hardening effect to be produced at lower heats and in less time than at ordinary pressure; but the difficulties of working in this way more than counterbalance these advantages.

In hardening pure neutral fats by sulphurous acid the times and temperatures employed are the same as above described. No oxide of copper is needed; but without certain important precautions a very hurtful brown color will be imparted to white fats—tallow, for example.

To obtain white products it is necessary that the sulphurous-acid gas should be unmixed with even a slight trace of atmospheric air or oxygen. Therefore the apparatus should be carefully swept clear of air by a current of the gas; also, before using it the gas should be proved to have no browning action upon a small quantity of pure neutral tallow exposed to it at 500° Fahrenheit for twenty minutes. The gas should also be perfectly washed from vapors of sulphuric acid. To obtain white products the fat treated should be pure and neutral and free from any mixture with acid, rancid, or oxidized fats. Some fats which have become slightly oxidized will still yield good results if heated up to 500° Fahrenheit for a short time before admitting the sulphurous-acid gas.

The method by which animal fats have been

extracted from the membraneous tissues has an important influence upon their ability to retain a pure white color when subsequently heated by sulphurous acid. Tallow rendered by Evrard's process, with weak solutions of caustic soda, gives the best result. That obtained by D'Arcet's process, with dilute sulphuric acid, is not equal to Evrard's, but is superior to that rendered by the common process of heat alone.

When copper vessels are used they should be perfectly cleaned from oxide, and should be filled quite full of the fat, and their upper part should be lined with stoneware or enamel, so as not anywhere to expose the copper uncovered by the fat to the acid gas. The effect of the treatment by sulphurous acid at elevated temperatures upon tallow, whether acid or neutral, taken as an example, is to make it more hard and dry, and to increase the quantity of solid matter obtainable from it by pressing. When it is slowly cooled from a state of fusion the stearine crystallizes out from the oleine much more perfectly than in common tallow. Another effect of this treatment of fatty bodies is to improve them for the manufacture of soap. Many oils producing soft and slimy soaps in their natural state give more hard and dry products after having been thus acted upon.

I do not claim generally the process of hardening fatty substances by sulphurous acid, as I am aware that this has been before proposed; but in such cases the heat employed has been under or about 212° Fahrenheit. Now, I have found that the hardening effect of sulphurous acid is very greatly increased by causing it to act upon the fatty substances at more elevated temperatures, preferring from about 350° to 550° Fahrenheit, but which may be varied from a little above 212° Fahrenheit to above the distilling-point of the fatty substance, and it is to this modification of the process that this part of my claim extends and is confined.

I am also aware that it has been before proposed to decompose fatty substances and soaps into fat-acids, and to purify fatty substances from mucilage, gelatine, &c., by means of sulphurous acid, and also to subject fatty substances to the action of strong sulphuric acid, whereby sulphurous acid is generated in the fat itself; and I wish it to be understood that I make no claim to any of the above processes.

I claim—

1. The hardening of acid and neutral fatty substances by subjecting them to the action of sulphurous acid at elevated temperatures, either with or without pressure, as above described.

2. The use of oxide of copper or its chemical substitutes to remove from fat-acids the sulphureted impurity produced therein by treatment with sulphurous acid, as above described.

3. The method of preserving the color of white neutral fats when heated by sulphurous acid at elevated temperatures by using the sulphurous acid entirely free from air or oxygen, and by using fats pure and neutral and free from any mixture of acid, rancid, or decomposed fats.

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Witnesses:

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