

UNITED STATES PATENT OFFICE.

HENRY CARMICHAEL, OF MALDEN, MASSACHUSETTS.

METHOD OF TREATING FIBROUS WARE.

SPECIFICATION forming part of Letters Patent No. 377,928, dated February 14, 1888.

Application filed February 15, 1887. Serial No. 227,734. (No specimens.)

To all whom it may concern:

Be it known that I, HENRY CARMICHAEL, a citizen of the United States, residing at Malden, Massachusetts, have invented certain new and useful Improvements in Methods of Treating Fibrous Ware; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the induration and treatment of articles previously molded or otherwise formed of wood pulp or similar fiber, and the novelty consists in the adaptability of the materials used to the purpose to which they are applied and the different steps of the treatment necessary to attain the desired result. Heretofore similar articles have been treated with boiled linseed-oil, as described in the United States Patent No. 10,282, reissued to me February 6, 1883, and with colophony, as described in United States Patent No. 342,179, issued to me May 18, 1886. The linseed-oil process is expensive and the colophony process requires that the article treated should be subsequently baked to secure the best results.

My present invention is designed to wholly or in part overcome these disadvantages and at the same time secure as good results by a more simple process with cheaper materials. My object is to make the articles after treatment hard and elastic and tough and at the same time make them water-proof and impervious to any ordinary substances with which they would be likely to come into contact.

In the treatment of the porous article it is first thoroughly treated so as to expel any moisture that may remain from the process of molding. It is next subjected to a drying process that may in most instances be continued from steam heat to the point at which the fiber would be almost charred, or about 400° Fahrenheit. In the meantime a bath has been prepared by melting colophony in a suitable vessel by any approved means and raising it to the temperature of vaporization, which is maintained until a sample removed for the purpose is found when cooled to have acquired the necessary firmness and is no longer sticky. To facilitate the change, a current of air may be passed through the hot liquid and the colophony be thus "blown." At this stage I add to

the melted colophony about one-fifth part, by weight, of purified asphalt—such as is used by varnish-makers. I am guided in the amount of asphalt used by the porosity of the fibrous ware which is being treated, it being found in practice that the amount of colophony must be increased as the texture of the fiber ware is found to be closer. The article, previously dried and heated, as stated above, is immersed in this bath and is left therein until bubbles no longer escape. When the pores of the article are too minute for the penetration of the fluid and the escape of the air under usual conditions, or when from any other reason the article will only slowly absorb the indurating mixture, the process may be facilitated by exhausting the air from the vessel in which the articles are placed and introducing the indurating fluid under pressure. The article upon being removed from the bath is allowed to cool, and when cold it will be found that the colophony and asphalt have penetrated to the interior of the article and wholly or partially filled the interstitial spaces. The result is eminently satisfactory, and the article thus treated will be found to possess the qualities of rigidity, elasticity, strength, and resilience as well as imperviousness to fluids in a marked degree.

Should the induration be imperfect or leave the article sticky on account of carelessness in handling or any accident or oversight, the defect may be remedied by baking the article in an oven for an hour or so, when it will be found that the resultant further oxidation has removed all stickiness and simply made the article harder and more rigid, and this further step may be of course resorted to if it is desirable to increase such qualities in a more marked degree.

I prefer in this process to use natural asphalt, because it seems free from some deleterious qualities incident to other forms of asphalt; but I do not limit myself to its use.

I am well aware that attempts have been heretofore made to indurate and water-proof fibrous ware with asphalt by treating the same with heated or even melted asphalt; but the viscosity of that material when used alone, even when thin, prevents it from penetrating the fibrous ware, and when it is introduced into the fibrous ware by means of solvents

they must be subsequently removed, not only at some expense, but also at the risk of thereby injuring the ware. Obviously my invention has nothing in common with such processes.

5 I claim—

1. The process of treating fibrous ware, which consists in subjecting it to the action of a mixture of colophony and asphalt, as described.
- 10 2. The process of treating fibrous ware, which consists in subjecting it to the action of a mixture of colophony and asphalt and subsequently baking the article, substantially as specified.
- 15 3. The process of treating fibrous ware, consisting in saturating the ware when thoroughly dried and heated with a mixture of colophony and asphalt, substantially as described.
4. The process of treating fibrous ware, 20 which consists in first depriving it of its moisture by any suitable means and then subjecting the articles previously raised to a steam heat or above to the action of a mixture of colophony and asphalt, substantially as described.
- 25 5. The process of treating fibrous ware, which consists in saturating the article, previously raised to a high temperature, with a mix-

ture of colophony and asphalt in the proportion of about one-fifth part, by weight, of the latter to one of the former.

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6. The process of indurating fibrous ware, consisting in first depriving it of its moisture, then raising it to a temperature of steam heat or above, and while in that condition subjecting it to the action of a mixture of colophony 35 and asphalt and subsequently baking the ware so treated, substantially as described.

7. The process of treating fibrous ware, consisting in forcing into the porous ware a mixture of colophony and asphalt by exhausting 40 the air of the vessel in which the fibrous ware is treated, substantially as described.

8. The process of treating fibrous ware, which consists of placing the same in a suitable vessel and admitting to it, under pressure, 45 a liquid mixture of colophony and asphalt, substantially as described.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

HENRY CARMICHAEL.

Witnesses:

HENRY BAYLIES,

HENRY F. QUIRST.