

# UNITED STATES PATENT OFFICE.

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TREATMENT OF CELLULOSE AND THE MANUFACTURE OF ARTICLES THEREFROM.

SPECIFICATION forming part of Letters Patent No. 257,607, dated May 9, 1882.

Application filed August 19, 1881. (No specimens) Patented in England March 8, 1881, in France August 5, 1881, and in Belgium August 6, 1881.

*To all whom it may concern:*

Be it known that I, ALEXANDER PARKES, a subject of the Queen of Great Britain, residing at Sutton Coldfield, Birmingham, in the county of Warwick, England, have invented certain new and useful Improvements in the Treatment of Cellulose and the Manufacture of Articles therefrom, (for which I have received Letters Patent in England, No. 983, dated March 8, 1881; in France, No. 144,257, dated August 5, 1881; and in Belgium, No. 55,383, dated August 6, 1881;) and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

Heretofore vegetable fiber and various vegetable fibrous substances have been treated with solutions, and so reduced to a pulp-like mass used to coat or to form entire a variety of articles.

In accordance with my invention, instead of using chloride of zinc or other solutions heretofore used in the treatment of vegetable fibrous substances, I employ iodide of zinc or nitrate of zinc or nitrate of lime to first obtain a complete solution of cellulose or such like substance from cotton or linen fiber, or from paper or fabric made from such fiber, or from other woody cellulose, and combine with it coloring matters or pigments, and mold or shape the mixture into various forms by pressure or otherwise; or I employ it for coating paper or other surfaces.

For dissolving the cellulose the iodide of zinc or nitrate of zinc should be employed as neutral as possible and concentrated to a sirupy condition of about 1.600 to 1.800 specific gravity, heated to about 200° Fahrenheit, or it may be to a higher temperature, but not so high as to cause carbonization of the cellulose or woody fiber. Although I prefer iodide of zinc or nitrate of zinc, nitrate of lime may also be used, either alone or together with the above solvents. Whether I employ nitrate of zinc or iodide of zinc or nitrate of lime as the solvent, it must be concentrated to from 1.600 to 1.800 specific gravity, and by preference heated to about 200° Fahrenheit—say 180° to 250° Fahrenheit. The cotton or paper (whether pulped or other-

wise) or fiber is immersed in the solvent, and quickly dissolves, and I continue to add fiber or paper until the solution arrives at a stiff, pasty condition, suitable kneading or mixing machinery heated to the required temperature being employed to break or blend up the compound as the dissolving of the cellulose goes on. The pasty mass may also be put by for future use and masticated afterward.

If the cellulose solution is to be used for coating paper, textile fabrics, leather, wood, metals, and such like, it may be used thinner than when entire articles are to be shaped and molded from it.

For coating paper, textile fabrics, and other surfaces, I prefer to use the cellulose solution in a pasty and well-blended state and heated so that it shall remain plastic. I spread it upon the paper by the use of a gage-knife and rollers or other spreading machinery, with the solvent still remaining in it, as by so doing I find it will be firmly attached to the paper or other surface; and two or more coats may be applied if it is desired to increase the thickness. When the coating has been effected the solvent can be removed by washing in water or alcoholic solutions. The articles so coated may be calendered or embossed or otherwise finished, and will produce upon the paper or other substance a fine, hard, flexible surface.

Sheets and other forms and hollow ware may also be molded from the cellulose solution while the solvent remains in it, and the solvent can afterward similarly be removed by water or alcoholic or vegetable naphtha solutions, and the articles so formed may be further finished by rolling, pressing, or otherwise to consolidate them and give to their surface a finer and more ornamental character. For removing the solvent I much prefer to use alcoholic or vegetable naphtha solutions. The iodide or nitrate of zinc or nitrate of lime can then readily be recovered by distilling off the spirit, and, in addition, the cellulose material is left in a transparent state, whereas if water is used for removing the solvent the material is left in a cloudy, opaque condition.

I have also found that the solvent of the cellulose may be first removed by washing the solution in an agitating or pulping machine, and

that the washed cellulose may then be pressed or rolled into sheets or other forms, whether combined with pigments or colors or not.

I have also found that I can wash and then  
5 pulp or granulate the dissolved cellulose and color it by dyes or pigments, and in this pulped condition it does not lose the property of strongly adhering together when subjected to pressure and slightly heated in molds or in  
10 rolling or spreading machinery. It can also be floated—as in paper-making—upon fabrics, or can be made into a substantial sheet alone. On being calendered in the usual way it forms a fine vellum-like sheet or substance, and by  
15 these means I am able to form a new and valuable substance, as hard as ivory, tortoise-shell, or horn, and which, being free from smell, and also unflammable, may be used for an endless variety of purposes. The hard substance  
20 formed as above can be turned in a lathe, cut with a saw, and shaped or finished into figures, animals, tubes, combs, buttons, knife-handles, and other articles, plain or ornamental, and may be white or black or colored with  
25 a variety of delicate colors, pigments, or dyes, as desired.

I claim—

1. As an improvement in the process of making articles in whole or part of cellulose, the  
30 treatment with a solvent consisting of a solution of iodide of zinc or its specified equivalent, substantially as described.

2. As an improvement in the process of making articles in whole or in part of cellulose, the treatment of the dissolved cellulose with the  
35 alcoholic or described equivalent solution to remove the solvent.

3. The process hereinbefore described of making articles of cellulose and of coating articles therewith, consisting in first dissolving  
40 cellulose in a solution of iodide of zinc or its specified equivalent, then molding the dissolved cellulose to the form of article required, or spreading it over the surface of the article to be coated, then removing the solvent  
45 by washing, and finally rolling, pressing, or calendering the article or coated article.

4. The process hereinbefore described of making articles of cellulose or partly of cellulose, consisting in first dissolving cellulose, as  
50 above set forth, in iodide of zinc or its specified equivalent, then washing out the solvent from the cellulose, and then molding the cellulose to the form required by subjecting it to pressure in molds or otherwise, or by rolling  
55 or spreading machinery.

ALEXANDER PARKES.

Witnesses:

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