

UNITED STATES PATENT OFFICE.

HEINRICH BRUNSWIG, OF SIEGBURG, GERMANY, ASSIGNOR TO THE VEREINIGTE KÖLN-ROTTWEILER PULVER FABRIKEN, OF COLOGNE, GERMANY.

METHOD OF TRANSFORMING FIBROUS CELLULOSE INTO A DENSE MATERIAL.

SPECIFICATION forming part of Letters Patent No. 622,325, dated April 4, 1899.

Application filed August 30, 1897. Serial No. 650,049. (Specimens.)

To all whom it may concern:

Be it known that I, HEINRICH BRUNSWIG, doctor of philosophy, a subject of the German Emperor, residing at Siegburg, in the Province of the Rhine, and in the German Empire, have invented a certain new and useful Improved Method of Transforming Fibrous Cellulose into a Dense Material; and I do hereby 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.

The object of the invention is the production of a hard, dense, horny substance from fibrous cellulose without the use of any solvent except water or any cementing material or other chemical agent. In the preparation of paper-pulp it is well known that if the pulping is carried too far the felting power or property of the material is reduced and ultimately destroyed. I have discovered that by further disintegration the fibrous structure of the cellulose is completely eliminated or destroyed and the pulp is reduced to an impalpable condition, and the resultant mass, even without the assistance of any solvent or any cementing or binding material, becomes upon drying a hard, dense, horny substance which can be used advantageously as a substitute for horn, vegetable ivory, artificial wood, and the like.

In carrying out my new process I take ordinary natural or artificial fibrous cellulose, preferably such as has been freed from incrusting materials, and grind or cut the same in the presence of water in a rag-engine or pulp-machine until I reduce it to an impalpable condition—that is, to a condition in which the fibrous structure of the cellulose is no longer apparent. By reason of this extended or protracted grinding of the pulp a large number of the cells which would otherwise remain closed are opened up and brought into contact with water. A pulp is thus obtained from which a part of the water is drawn off in any suitable way, as by a dense filter. The product in this condition consists of a kneadable paste, which may be further freed from a part of its water by any suitable treat-

ment, as by means of a filter-press or centrifugal machine. The paste resulting from the pulp partially freed from its water is molded into any desired form and dried in any suitable way, either in the open air or at a gentle heat or by means of a blast of air. In the process of drying the cellulose condenses or shrinks up and forms a hard tough mass of 1.4 to 1.5 specific gravity. For convenience I term this substance "cellulith." The hard product can be worked with tools like wood, horn, vegetable ivory, and the like and can be used for imitation ivory, &c. It is remarked that the pulping operation should be carried to the utmost extent. Otherwise the shrinkage of the paste in drying does not take place to its fullest extent, and consequently the final product does not have the high specific gravity or the horny aspect of cellulith. When it is important to obtain the cellulith in a perfectly pure and homogeneous condition, the pulp should be boiled by the admission of steam or otherwise to expel the air contained in the pulp, after which it should be freed of impurities and such particles of cellulose as have not been completely reduced by passing the same through a screen of proper mesh or otherwise.

The hardness and density of cellulith can within certain limits be controlled by adding to and mixing with the liquid pulp or with the plastic mass prior to drying finely-divided substances which are either soluble in water or not—such as heavy spar, lamp-black, salts, and the like—which, according to the purpose in view, may either be left in the mass or subsequently partially washed out by means of water.

Cellulith may also be colored in any desired manner by adding coloring material to the pulp or paste. When it is desired to make cellulith waterproof, it will be advantageous to add waterproofing substances, such as dissolved shellac or caoutchouc, to the mass.

Having described my invention and in what manner the same is to be performed, I claim as new and desire to secure by Letters Patent—

1. The process herein described of trans-

forming cellulose into a dense substance, which consists in disintegrating and reducing fibrous cellulose to an impalpable condition in the presence of water, draining a part of
5 the water from the mass, molding the resultant paste into desired forms, and finally drying the same.

2. The process herein described of transforming cellulose into cellulith, which consists in disintegrating and reducing fibrous
10 cellulose to an impalpable condition in the

presence of water, boiling the resultant pulp to expel the air, removing the impurities and unreduced cellulose, molding the paste into desired forms and drying it, substantially as
15 described.

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

HEINRICH BRUNSWIG.

Witnesses:

WILLIAM H. MADDEN,
CHRISTINE PFEIFFER.