

UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN PROCESSES OF TREATING VEGETABLE FIBROUS SUBSTANCES, &c.

Specification forming part of Letters Patent No. **217,448**, dated July 15, 1879; application filed August 24, 1878.

To all whom it may concern:

Be it known that I, WILLIAM COURTENAY, of the city, county, and State of New York, have invented a new and useful Improved Process of Treating Vegetable Fibrous Substances and Method of Utilizing the Scraps and Waste of Vulcanized Fiber; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the treatment of paper or paper-pulp, raw cotton, rags, or other vegetable fibrous substance, in a ground or comminuted form, with a strong solution of the chlorides of zinc, tin, calcium, magnesium, or aluminum; and also to the reworking of all gelatinized cellulose, whether originally treated with sulphuric acid, the chlorides above enumerated, or any other of the various well-known methods for gelatinizing cellulose, or making parchment-paper, and is intended to be an improvement upon the method described by A. T. Schmidt in Letters Patent No. 113,454, dated April 4, 1871, under which large quantities of goods are now being manufactured and sold to the trade under the name of "vulcanized fiber."

To enable others skilled in the art to use my improvement, I will proceed to describe the process I employ, which consists of the use of a bath or admixture of the chlorides of zinc, tin, calcium, magnesium, or aluminum, or the mother-waters thereof, concentrated to a strength of 70° or 75° Baumé, and heated to from 90° to 260° Fahrenheit, (according to the nature of the vegetable fibrous substance to be treated,) in which the substances to be treated are immersed, and thoroughly stirred, mixed, and kneaded until the entire mass has become sticky, mucilaginous, and spongy, after which it is subjected to heavy pressure, to render it homogeneous and to separate the mass from the surplus chloride, which exudes therefrom under the pressure, and can be collected and used again. At this stage the mass is ready for rolling into sheets or molding into any of the various forms required, for which several methods may be employed, care being always taken to allow for the shrinkage of the goods in the subsequent treatment, which is very great, ranging from fifty to sixty per cent. when pure cotton-rag fiber is used, but which may be greatly reduced and accurately

determined by the admixture therewith of foreign substances for which the metallic chlorides have no chemical affinity.

Among the substances which may be introduced for this purpose may be named graphite or plumbago, ground resin or pitch, any of the resinous gums, sawdust, hemp, jute, silk, linen threads, talc, and a variety of other materials, varying according to the purposes for which the goods are intended.

An admixture of graphite in the proportion of from ten to twenty per cent. is found to produce an excellent material for journal-bearing, slides, &c. The admixture of the resinous gums permits the goods to be subsequently finished and formed under heat and pressure, whereby the gums are fused throughout the mass, producing a high gloss, and rendering them to a large extent impervious to moisture.

The use of a proportion of hemp, jute, silk, or linen threads adds greatly to the toughness and tensile strength of the product; and in this manner, by varying the adulterants employed, the product can be adapted to an almost endless variety of uses.

One of the chief novelties of my invention consists in the method of preparing the vegetable fibrous substances to be used.

The usual method employed by those manufacturing under the A. T. Schmidt patent, No. 113,454, is to treat the paper in the sheet, winding it around cylinders of greater or less diameter, and thus limiting the product to either tubes or sheets. From these sheets various shapes are cut, including an immense number of washers, resulting in large amount of scraps too small to be of any use. Prior to this invention no economical method has been devised for reworking or utilizing these scraps, which are consequently waste, thereby considerably enhancing the cost of the goods to the consumer. I take these scraps of vulcanized fiber, or any kind of gelatinized cellulose, and reduce them to a fine powder. This may be done in various ways; but the method which I have employed successfully is to first soak the scraps in water until they become quite soft, and then grind them in a Bogardus mill, through successive pairs of plates of different degrees of fineness, finally bolting it like meal.

It is found that the heat generated by grind-

ing is sufficient to dry the material. This ground vulcanized fiber is even more readily gelatinized by the chlorides described than pure cotton paper. It is, however, often found desirable for certain uses to mix with this ground vulcanized fiber a certain proportion of paper sawdust, ground cotton rags, or the various foreign substances already recited or some of them.

The result is equally favorable when the whole body of material to be treated is composed of ground or comminuted paper and rags, or paper-pulp, or even raw cotton or ground rags alone; but in these cases the strength of chlorides and the degree of heat used must be determined by the nature of the materials and the extent to which it is desired to carry the gelatinization.

As the mass presents certain well-known peculiarities at each stage of the process those skilled in the art will have no difficulty in regulating the treatment. It is also found desirable in treating other vegetable fibrous substances which are more refractory in their nature, such as esparto grass, ramie, jute, hemp, manila, &c., to first subject them to a bath of dilute sulphuric acid at a low temperature, subsequently washing thoroughly in water in the well-known manner of producing parchment-paper, and, after reducing them to a comminuted state and thoroughly drying, to subject them to the treatment of the specified chlorides or the mother-waters thereof, either alone or in combination with ground vulcanized fiber, raw cotton, rags, or paper sawdust.

It is obvious that coloring-matters of all kinds which do not interfere with the chemical action of the chlorides may be introduced into the ground or comminuted material before treatment, and thus impart any desired shade of color to the manufactured goods—such, for instance, as any of the earth paints, aniline, or other chemical colors, either simple or compound.

The final process of the manufacture of these goods from this comminuted material is the same as that described in A. T. Schmidt's Patent No. 113,454, and consists in soaking the goods, either in sheet or molded forms of all kinds, in successive baths of pure water until all the chlorides have been extracted, which may be recovered by evaporation and used over again.

Should it be desired to have the goods of hard, horny, and ivory-like nature, they are carefully dried in the sun and air or by artificial heat, and refinished under heavy pressure in hot molds or rolls, which gives a smooth finish. Should it, however, be desired to have them of a spongy, flexible nature, like leather or soft india-rubber, they are taken from the last water-bath and immersed for twenty-four hours or longer in a bath composed of pure glycerine and water of a strength about 12°

Baumé, and then subjected to the drying process until all the water is evaporated. This gives a much more spongy and elastic product than that secured by treating the paper in the sheet.

It is impossible to describe all the uses to which this new material may be put; but any one familiar with the innumerable articles made of vulcanized rubber, horn, celluloid, and similar compounds can readily conceive that its field is unlimited.

I do not claim the use of chloride of zinc, or of the other chlorides named, to produce gelatinization, as that is not novel.

What I do claim, and desire to secure by Letters Patent, is—

1. The utilization of scrap vulcanized fiber, waste-paper, cotton rags, and other vegetable fibrous substances, by an admixture of the same, either separately or together, with either of the chlorides named, or the mother-waters thereof, and subjecting the same to heat, kneading, and pressure, substantially in the manner described.

2. The treatment of these vegetable fibrous substances to a bath of dilute sulphuric acid, in the manner described, before the admixture of the same in a comminuted form with the metallic chlorides, to render them more susceptible to the treatment proposed and produce a greater or less degree of gelatinization.

3. The admixture of graphite, resin, gums, and other foreign substances with the comminuted fibrous matter before the treatment with metallic chlorides, for the purposes hereinbefore described, said admixture not being possible with paper in the sheet, as now usually treated.

4. The method of controlling the contraction of the goods molded by the admixture therewith of suitable foreign substances, as described.

5. The method of refinishing these molded goods in hot dies or rolls to give them a gloss, and, by partial fusion of the resinous gums, to render them impervious to moisture.

6. As a new article of manufacture, the goods prepared under these various methods of ground or comminuted vulcanized fiber and other vegetable fibrous substances, substantially in the manner and for the purposes as set forth.

7. The method of coloring the substance by the admixture of any coloring-matter which will not affect the chemical action of the chlorides, as described.

In testimony whereof I, the said WILLIAM COURTENAY, have hereunto set my hand.

WILLIAM COURTENAY.

Witnesses:

CHARLES MEYER,
E. J. MITCHELL.