

United States Patent Office

AUGUSTUS THEODORE SCHMIDT, OF PITTSBURG, PENNSYLVANIA.

Letters Patent No. 61,267, dated January 15, 1867.

IMPROVEMENT IN THE MANUFACTURE OF PAPER AND TREATMENT OF PAPER PULP.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, AUGUSTUS THEODORE SCHMIDT, in the county of Allegheny, and State of Pennsylvania, have invented a new and useful Improvement in the Manufacture of Paper and Treatment of Paper Pulp and other fibrous substances; and I do hereby declare the following to be a full, clear, and exact description thereof.

My improvement consists in the mode hereinafter described of treating paper, either in the process of manufacture or after it has been finished, and either in a sized or unsized condition, whereby its strength and durability are greatly increased, it is rendered in a great degree, if not entirely, impervious to water, oil, and other fluids and gases, and also capable of resisting the destructive action of the strongest acids and alkalies. My improvement is also applicable to the treatment of textile fabrics, such as linen and cotton cloth, rendering them, in a great measure, water-proof, and increasing their strength and durability. By means of my improvement vegetable textile fabrics, and especially paper, are rendered susceptible of application to many uses to which they are not adapted as ordinarily manufactured. This is peculiarly the case with paper, which is easily made from almost any description of vegetable fibre, and being readily moulded into any desired shape, may, when rendered water-proof, air-proof, and acid-proof, by my process, be applied to a variety of useful purposes, for domestic use, and in the arts and manufactures, as a substitute for leather, glass, cotton and linen cloth, India rubber, bladder, parchment, and various other articles, for many of which purposes it is vastly superior to the articles the use of which it is designed to supplant.

To enable others skilled in the art to make and use my invention, I will proceed to describe the process by which I produce the results which I have stated.

As applied to paper, my process is as follows: The pulp being prepared of any desired vegetable fibre, in the ordinary manner, is made into paper, by hand or by machinery, as usual; and before being made into sheets, is exposed to a gentle heat, as is usual, to remove the excess of moisture and make it dry or nearly so. It is then passed through a bath, consisting of a mixture of one part of glycerine, ($C_3H_5O_3$), and two parts of oil of vitriol, (SO_3HO), and nine parts of water, mixed together and placed in a suitable vessel, which may, if desired, be conveniently attached to the paper-making machinery. The paper is immersed in or passed through this mixture until completely saturated therewith, when the excess of fluid is removed by pressure-rollers or scrapers or otherwise, the kind of apparatus used in my process being immaterial so as it accomplishes the result. The effect of this mixture on the fibre of the paper is to change its character and texture, and to form on its surface a gelatinous covering, by the dissolving of portions of the pulp in the oil of vitriol and the mixture therewith of the glycerine. After the paper or pulp has been treated with this mixture of glycerine, acid and water, it is passed through an alkaline bath, consisting of a solution of ammonia, soda-lye, or other alkali of sufficient strength to neutralize the acid of the oil of vitriol, (the constituents of which are sulphuric acid and water,) and arrest its further action on the fibres of the paper. The paper may then be passed through water and afterwards dried and treated in the usual way. If calendered by passing between heated rolls, care should be taken not to have the rolls too hot, which would render the paper hard and brittle. Paper in sheets, either sized or unsized, may be treated in the manner described, after it has been manufactured and finished in the usual manner, provided it has not been sized with animal gelatine or glue; and when treated by my process, and dried, pressed, or calendered, possesses the qualities which I have described.

If paper pulp, in mass, be treated in the manner described by my process, it may, while yet moist, after passing through the alkaline bath to neutralize the acid, be moulded into any required shape, and of any desired thickness, to form vessels for holding water, acids, &c., or for soles of boots and shoes, for buttons, and for various other purposes. So, also, sheets of paper, before being dried, may be united at the edges to form bags or other articles, or may be laid in piles, one on top of another, and when compressed will unite in a solid mass or board of any desired thickness.

Cotton and linen cloth, and other textile fabrics or articles of vegetable fibre, may be treated by my process, by passing them through the mixture of glycerine, oil of vitriol, and water, and afterwards washed in an alkaline bath, and be thereby rendered stronger, more durable, and water-proof.

In describing the proportions of ingredients used for treating textile fabrics, paper, and other vegetable fibrous substances by my process, I have stated that which I find to accomplish the result successfully, but I do not wish to confine myself to the exact proportions which I have named.

It is almost impossible to enumerate the various purposes to which my invention is applicable. As paper prepared by my process is not injuriously affected by nitric acid, or by sulphuric acid, cups or cells may be made of it for galvanic batteries, and vessels for preparing or manufacturing those acids, and other purposes in chemical operations and processes. As paper so treated is very strong when wet, assuming the appearance of bladder, it may be used as an air-tight covering for cases and vessels, and for putting up chemicals, by being stretched over them when moistened; and as it resists the action of caustic alkalies, and is impervious to water or air, it may be used to advantage for enclosing such chemicals as deliquesce when exposed to the action of moisture or of the atmosphere.

Paper, when prepared in the manner described, assumes the appearance and has several of the characteristics of parchment, and is admirably adapted for use for legal and other documents requiring durability and permanency. When made thin it is also, owing to its great strength and toughness, even when wet with water, peculiarly suited for printing bank notes, bonds, fractional currency, and similar purposes. It may also be used for water-proof lining for boots and shoes; for lining for tanks in oil and acid manufactories; for hat bodies; for bookbinding; for hose or pipes for oil, water, or steam; for valve-seats; for bags for carrying fluids, butter, ice-cream, &c., and for very many other purposes.

Having thus described my improvement, what I claim as my invention, and desire to secure by Letters Patent, is—

The process hereinbefore described of treating paper, paper pulp, and textile fabrics of vegetable fibre, with a mixture of glycerine, oil of vitriol, and water, and subsequently with an alkaline bath, or the equivalent of such process, substantially as and for the purposes hereinbefore described.

In testimony whereof I, the said AUGUSTUS THEODORE SCHMIDT, have hereunto set my hand in presence of—

A. T. SCHMIDT.

Witnesses:

W. BAKEWELL,

A. S. NICHOLSON.