

UNITED STATES PATENT OFFICE

HERMAN DUEMLING, OF FORT WAYNE, INDIANA.

IMPROVEMENT IN PROCESSES FOR FILLING FIBER IN PAPER-PULP.

Specification forming part of Letters Patent No. **157,198**, dated November 24, 1874; application filed October 10, 1874.

To all whom it may concern:

Be it known that I, HERMAN DUEMLING, of Fort Wayne, in the county of Allen and State of Indiana, have invented a new Improvement in the Manufacture of Paper, of which the following is a specification:

The object of my invention is to so improve the manufacture of paper that the addition of the filling materials to the pulp is not accomplished by mechanical admixture, as heretofore, but fixed by a chemical treatment of the fibers, so as to produce thereby a paper with a uniform proportion of inorganic materials that affect neither the sizing nor color, but give a superior whiteness to the same.

The main disadvantage of the different materials hitherto employed for the purpose of filling is that the full percentage of them is not made available, as by the mechanical admixture in the beating-engine considerable part is dissolved in the water, and afterward carried off therewith without serving its purpose, so as to occasion loss and increase the expense of the paper. The proportions of filling material is, therefore, not uniform, and prevents thereby the manufacture of paper, having a fixed percentage of filling incorporated therein. Another disadvantage was the chemical influence of the filling on the sizing and color, by which the appearance of the paper was frequently changed and the quality determined.

My invention consists mainly in the chemical fixing of the filling material in the fibers of the pulp in the beating-engine, or in a separate mixing-vessel, by means of the sulphates and silicates of the alkaline earths.

The recent development of the potash industry furnishes a part of the ingredients required for my process in considerable quantities, and at prices that make them available for employing them to the filling of paper-pulp. For this purpose the equivalent proportions of the ingredients are added in exactly computed quantities to the pulp in the beating-engine or other mixing-vessel, a solu-

tion of chloride of barium being first added, which is allowed to mingle intimately with the pulp, so as to penetrate thoroughly the fibers like a mordant. A solution of sulphate of magnesia is then added, by which an exceedingly white precipitate of sulphate of baryta is obtained, which has the quality to adhere intimately to the fiber, and produce thereby the nearly complete entering of the precipitate as filling into the paper. A solution of chloride of magnesium is then introduced to the pulp, and allowed to act thereon, to be then precipitated by a solution of silicate of soda, which produces a white and very voluminous precipitate of silicate of magnesia, which adheres firmly to the fiber. The pulp is then worked up into paper in the usual manner, furnishing a paper of superior whiteness, as both filling ingredients are of clear white color, by which the expense for bleachings is reduced, and having the great advantage of a uniformly distributed and chemically adhering filling in the product.

As there is hardly any loss of filling material the process is cheaper than the mechanical admixture, while, moreover, paper may be produced of uniform quality with a fixed and constant percentage of filling material that exerts no injurious influence on the sizing or color of the paper, nor occasions any mechanical or chemical deterioration of the same in any of the stages of its manufacture.

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

The process of filling paper-pulp fiber by first applying chloride of barium in the mixing-vessel; secondly, sulphate of magnesia; thirdly, chloride of magnesium; and, fourthly, silicate of soda, at the intervals and in the manner set forth.

HERMAN DUEMLING.

Witnesses:

OTTO HANSER,
AUGUST CRULL.