

UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN TREATING PAPER AND CARD-BOARD TO FIX MARKS BY METALLIC PENCILS.

Specification forming part of Letters Patent No. **144,678**, dated November 18, 1873; application filed May 16, 1873.

To all whom it may concern:

Be it known that I, HENRY M. JOHNSTON, of the city, county, and State of New York, have made a new and useful Improvement in Compositions for Coating Paper so as to Fix upon it Writing or Marks Made by Metallic Pencils; and I hereby declare the following to be a full and exact description of the same.

Metallic pencils have long been used for writing on paper and card-board; but the marks are pale, and easily erased by rubbing or washing.

Now, my invention consists in applying certain chemical compounds to the surface of the paper, which act very much like what are known as mordants in the art of dyeing and printing—that is, they bring out and fix upon the paper the mark or writing made by the metallic pencil, so that it cannot be removed by rubbing or washing. The application to the surface of paper or card-board of a chemical coating or mordant, so that a metallic mark becomes fixed upon it, constitutes my invention.

I will now proceed to describe my invention so as to enable any one skilled in the art to make and use the same.

I weigh eighteen ounces of glue and soak it for twenty-four hours in six pints of water. I then place the vessel containing the soaked glue in a water-bath and apply heat sufficient to dissolve the glue. I then strain the glue solution through a flannel strainer. (The kind of glue I prefer to use for the purpose is that known as Coignet's No. 1 glue.) I then take twenty-eight pounds of Kremnitz white in dense pulp, and mix it intimately with nine pints of water, to which I then add the entire amount of glue solution, as before prepared, and thoroughly mix the whole together; and when it is desirable to imitate the color of other papers, I then stain the mixture with any suitable coloring matter; but the staining of the mixture is not essential to my invention. I then take animal or vegetable sized paper, which I prefer to be calendered, and apply the mixture to the surface of the paper by means of brushes, either by hand or by machinery, in the same manner as in the coating of card-board or paper-hangings; and after the coating is dry, and when the purpose for which the paper is to be

used requires that both sides be coated, I then coat the reverse side of the paper with the mixture in the same manner as before, and allow it to dry. After drying, there is found upon the surface of the coating a film of fine particles, which have but little adhesion to the body of the coating. This film I remove, exerting a gentle friction upon the coating with a soft brush or other suitable friction-surface. I then pass the paper or card-board between highly-polished calendering-rolls under pressure sufficient to smooth its surface and impart a high lustrous finish; or, when the paper is very thin, I place it in contact with or between highly-polished steel plates, and then pass the plates between calendering-rolls under pressure, which smooths the surface of the coating and imparts to it a high finish. I then prepare a solution of salts, in proportions and in the manner as follows: Commercial sulphate of alumina, eleven ounces; chloride of ammonium, eight ounces; chloride of sodium, eight ounces; biborate of soda, four ounces; water, two gallons.

To make the solution of the foregoing salts, I take a porcelain-lined kettle and put into it the sulphate of alumina and half of the water, and then place the kettle over the fire and heat the water nearly to the boiling-point, and when the sulphate is dissolved I add and dissolve the chloride of ammonium by occasional stirring. I then add the chloride of sodium, and when dissolved I add the biborate of soda, and stir the solution until the last-named salt is completely dissolved and the solution becomes clear. I then remove the kettle from the fire and add the remaining gallon of water, and allow the solution to get cold and all extraneous matter to settle to the bottom. I then decant the clear solution into a wooden trough, and in it I immerse the coated paper or card-board which I have described, and I subject it to the action of the solution for a period of time varying from half a minute to a minute. I then remove the paper or card-board from the solution and pass it through water, so as to remove the superfluous solution of salts and prevent any crystallization of the salts on the surface of the coating, and then allow it to dry. I then flatten the paper by passing it between calendering-rolls.

The paper or card-board so treated will be found to have undergone a great change. The high luster will no longer exist, and a chemical compound or mordant formed which, when written on with a metallic pencil, acts upon the metal or alloy left by the writing, and brings out the color and fixes the writing permanently upon it.

I do not limit myself to the precise proportions of the materials, nor to the precise materials hereinbefore enumerated, because it must be evident that the compounds may be greatly varied by an expert chemist without departing from the nature of my invention, and that the proportions may be so changed as to provide the paper with a more dense coating, or a thinner coating, as occasion may require.

The metallic pencil to be used for writing on this paper I prefer to make of alloys of lead and bismuth. The following formulas produce alloys suitable for the purpose: Lead, one ounce; bismuth, two ounces; or, lead, one ounce; bismuth, three ounces.

Other alloys may be used of these and other metals, as, for example, antimony instead of bismuth. Various degrees of hardness may be produced by varying the proportions of the alloys. What is essential is, that such a metallic pencil be used as will leave upon the paper a metallic mark, which, acting with the coating upon the paper, produces the color where the mark or writing is made, and fixes it upon it.

I am aware that coatings have been applied to paper-hangings, they being commonly known as washable hangings, and that similar coatings have been applied to card-board and paper, myself being the inventor of the processes by which they were made. I am also aware that paper has been coated with chemical compounds so that by writing upon it with a suitable fluid the reactions between the coat-

ing and the fluid ink would develop and fix a color upon the paper; but this requires the use of ink, which I especially avoid. I am further aware that certain compounds of nitrate of silver and other chemicals have been formed into crayons, or pencils generally known as indelible pencils, and used for writing, all of which I distinctly disclaim.

My invention renders paper and card-board suitable for making postal cards, note-paper, tablets, diaries, memorandum-books, journals, correspondents' and reporters' note-books, envelopes, and for almost innumerable other purposes where it is desirable to have a permanent writing or record without the use of pen or ink. Many persons, especially ladies, prefer to use a pencil in writing. It is always more cleanly and convenient, and frequently valuable notes and memorandums become erased and lost when put down in pencil. By my invention, all writing done with a pencil such as I have described is as permanent and durable as that of the most indelible ink.

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

1. The compounds herein described, or their chemical equivalents, for coating paper so as to fix upon it marks made by a metallic pencil, substantially as set forth.

2. The process herein described for treating paper, the same consisting in fixing upon its surface chemical compounds or mordants, so as to bring out and fix upon it metallic marks, substantially as set forth.

3. The new article of manufacture, paper having upon its surface a coating or mordant, substantially such as herein described.

HENRY M. JOHNSTON.

Witnesses:

H. N. ELDREDGE,
HENRY G. FORBES.