UNITED STATES PATENT OFFICE.

WILLIAM S. COLGROVE, OF DOWLING, OHIO, ASSIGNOR OF ONE-FOURTH TO FREDERICK H. SCHRODER, OF PEMBERVILLE, OHIO.

PAPER-MAKING.

SPECIFICATION forming part of Letters Patent No. 643,084, dated February 6, 1900.

Application filed September 8, 1898. Serial No. 690,502. (No specimens.)

To all whom it may concern:

Be it known that I, WILLIAM S. COLGROVE, a citizen of the United States, residing at Dowling, in the county of Wood and State of Ohio, have invented certain new and useful Improvements in Paper-Making; 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.

This invention relates to the preparation of safety-paper to be used for bank-notes, bonds, checks, receipts, promissory notes, accounts, and other financial and commercial purposes; and its object is to prevent the fraudulent alteration by acids of such instruments.

Briefly stated, the invention consists in treating the rolls or sheets of paper to a bath of lye and soluble indigo weak enough to avoid dyeing or further bleaching the paper and drying them cold, after which the application to the paper of any of the acids used in the fraudulent alteration of printing or writing will discolor both surfaces of the paper and so indelibly expose the fraud.

In the working of the invention I take soluble indigo and over it pour a quantity of wood-ash lye, the leach being of medium strength and about the color of a weak infusion of tea while hot, and the proportion of indigo kept down, so that it will not blue the mixture to ordinary eyesight. The proportion of soluble indigo to wood-ash in preparing the mixture may be as low as one-twentieth and should not be more than one-tenth, assuming both to be in a solution of medium strength. The strength of the lye and the indigo in the solution is a simple matter of experience and judgment and will vary according to the character of the paper to be treated, the test of proper strength being that the solution when applied to any roll or sheet of paper shall neither dye nor bleach the paper. When the leach has been poured over the soluble indigo, the mixture of the two is almost instantly effected and it is necessary to wait but a few minutes before straining the mixture to remove sediment. The liquid is then ready for use and can be applied to unmarketed paper at the factory, or any bookbinder or printer can apply it to the sheets of paper needed to fill an order for blank checks, receipts, promissory notes, or other blank forms, or books of record or account, or printed or engraved matter.

Paper treated as above described is not stained, discolored, or in any other way injured or depreciated by my preparation, nor is any such effect produced by the application of any kind of printing or writing ink; but any application of any kind of acid to one surface of the paper produces an irremovable stain on both surfaces and so exposes any attempt by means of acids to tamper with the writing or printing already on the paper.

Concentrated lye may be used in the preparation of the mixture where the user does not desire to personally leach the wood-ashes. The office of the lye is to carry the soluble indigo, which is the discoloring-matter, into the texture of the paper and deposit it there ready to react and spread to and on the surface when reached by any acid applied to paper.

To better understand the nature and scope of my invention, let it be assumed that I take four sheets of ordinary bank-check paper, each twenty-two by twenty-four inches, enough for one hundred ordinary checks with stubs. To treat those four "signatures," as the sheets are technically called, I take one hundred and sixty pennyweights of common wood-ash lye of the color of a weak infusion of tea when hot. Into this leach I put eight pennyweights of soluble indigo, preferably of a kind containing anywhere from one to not more than five per centum of green vitriol. After waiting the brief time necessary for the lye to dissolve the indigo I expel the greenish sediment by filtering or straining the solution. Then I place the solution in a clean, dry, broad, shallow vessel and separately dip and rapidly draw each signature into and through the solution, avoiding a soaking of the paper. Then I either blot the wet signature or sheet or run it between rollers, in either case keeping it under pressure till nearly dried, and the final drying is effected by the atmosphere in or out of doors. Paper being thus sensitized, it results that whenever any kind of acid is touched to either

surface of it a blue stain will come to each surface irregular in form and of a little larger area than that of the acid applied.

In actual working of my invention those using it may sometimes find it most convenient to use some brand of commercial concentrated lye instead of preparing the wood-ash leach for themselves. In such a case they will have to dilute the concentration with soft cold water, their own judgment, experience, and a few actual trials teaching them how to prepare the dilution. Similarly it may be more convenient to use some brand or another of package indigo as prepared for the market, provided it be soluble in alkali, and as to that I repeat the remark just made.

I do not claim the use of lye and indigo, or either, in or for the bleaching or dyeing of paper, but only the use I have described for the sensitizing of paper in the manner I have described.

Having thus fully described my invention, I claim as follows:

As a new manufacture, safety-paper adapted both to printing and writing, sensitized as to acids by immersion in a weak and cold solution of commercial lye and soluble indigo, without further bleaching or dyeing of the paper, and then cold-dried, all substantially as and for the purposes hereinbefore fully described.

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

WILLIAM S. COLGROVE.

Witnesses:
DANIEL BROKA,
EDWARD FRUSHER.