UNITED STATES PATENT OFFICE.

MARTIN A. HOWELL, JR., OF OTTAWA, ILLINOIS.

SAFETY-PAPER.

Specification forming part of Letters Patent No. **28,370**, dated May 22, 1860.

To all whom it may concern:

Be it known that I, MARTIN A. HOWELL, Jr., of Ottawa, La Salle county, in the State of Illinois, have invented a new and Improved Paper for Bank-Notes and other Money Securities; and I do hereby declare that the following is a full and exact description thereof.

My invention relates to the means of preventing the counterfeiting of bank-notes and other paper securities; and it consists mainly in the application between the laminæ of thin paper of a colorless metal, either in foil or powder, to designate the character or denomination of such particular bill, note, or other security for which my improvement may be applied, as will be hereinafter more fully set forth. I will now proceed to describe how to manufacture the same so that others can use it.

I take a roll of thin lace or gauze, containing many yards, or a roll of very thin paper, as the case may require. After I have produced the roll of paper or fabric of the requisite width and length, I proceed to print upon its surface, at various points and at suitable spaces, figures, letters and designs, or any or either of them, the figures representing the denomination of the bill and such designs for bills of different denominations as may be desired. I print upon the surface with types or their equivalent, using a mordant to adhere a metal to their surface.

Now, to produce a letter which cannot be destroyed without destroying the engraving upon the exterior surface of the bill, I use the same black carbon ink which is used by the printer of bank-notes, which produces upon the fabric or paper a black letter which would appear when finished as though printed upon the exterior surface, and which could be photographed as easily as if printed upon the exterior.

Now, in order to defeat the photographer, I proceed as follows: After the impressions are laid by the types I dust the surface of the letters—which are not yet dry—with a finely-powdered metal or metal in leaf or foil, powdered metal being preferred, as the luster or brightness is less and when covered by the pulp for forming the bank-note paper it is rendered more obscure by a reflected light, consequently assisting the photographic process, and reversing the effect by transmitted light. After my roll of paper is printed throughout, I either cut out the excess of blank space or cut it into strips lengthwise, leaving those which contain the letters and figures, or either of them, and discarding the blank strips, which if left would interfere with the adhesion of the pulp sheets, in order that the pulp sheets may come more perfectly in contact surrounding the strips and enveloping them as they unroll, leaving no more unnecessary surface of the paper between the pulp sheets than is required to hold it in its proper position and to carry forward the denominations or devices as they are printed upon the surface at intervals or various points. After the roll of paper in strips or their equivalent is prepared, as herein described, it is affixed to a rod or spindle and placed at a point for support between the two revolving cylinders of a double-cylinder paper-machine, over each of which cylinders a very thin sheet of wet pulp is being carried from the vat. Now, as these two pulp sheets are coming in contact, which thoroughly unites their fibers, the end of the roll of paper containing the metallic letters or the end of the printed fabric, which is printed as hereinbefore described, is brought up between the two pulp sheets and placed in contact between them, and is carried forward by the motion of the machine with the pulp sheets thoroughly incorporated as one mass. It is then carried forward by the machine over the drying-cylinders and is finished by the ordinary mode of finishing bank-paper, the process of which is well known. When this paper is finished it is cut up into sheets to suit the required purpose, each sheet containing the denomination or device required, which upon the one side is almost imperceptible by a reflection of light, while by transmitted light the denomination or device appears opaque and not translucent, producing an effect to the eye of entire density, totally preventing the passage of light.

It is not entirely necessary to use an ink as a mordant to adhere the metal to the thin paper or fabric, neither is it necessary to confine the color to black, for various colors may be used as well as varnish, all of which are rendered non-translucent by the presence of metal or its equivalent upon its surface, at the same time rendered indistinct by the reflection of light.

My object in the application of metals or their equivalents to the surface of the inks or colors, is threefold: first, to produce a letter, figure, or design which by transmitted light produces great density and checks entirely the

passage of light; secondly, the surface of the metallic letter, especially of powdered silver or tin, is rendered very indistinct by a reflected light having no color—consequently it is impossible to counterfeit it by photography, either by a transmitted or by a reflected light; thirdly, metals are indestructible in a great measure—hence the great difficulty of extracting them in order to effect an alteration, which is entirely obviated by the use of a mordant in combination with the metal composed of the carbon inks or of the green oxide of chromium now used by our bank-note engravers for printing, for whatever is required to remove the one will most effectually remove the other, which results in the destruction of the bill.

I am aware that colors have been introduced into the interior of paper for the purpose of forming opaque letters; but all letters so formed were simply opaque, being translucent. For example, white lead or zinc are opaque as any colors can be, yet a glass painted with either is translucent; but if either be covered with a film of metal, in leaf or otherwise, the color is rendered even lighter and totally non-translucent and impervious to light. Now, there is no object in producing a letter otherwise than very light upon the face of the paper in consequence of the necessity of rendering it as imperceptible as possible, and also that the color may not interfere in any respect with the minute lines of the engraving should it extend entirely over the surface of the bill.

I disclaim the use of colors singly between the surfaces, or beneath the surface of the sheet when the surface on either side is unprotected by metals or their equivalents for producing the said effect; but

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

The application of metal in foil or in powder between the laminæ of thin paper, to designate the character or denomination of each particular bank-note or other money security for which my improvement may be applied, substantially as described.

In testimony of which invention I hereunto set my hand.

MARTIN A. HOWELL, JR.

Attest:
O. S. X. PECK,
A. POHLERS.