UNITED STATES PATENT OFFICE.

ALFRED FORD, OF 22 GLOUCESTER CRESCENT, REGENT'S PARK, COUNTY OF MIDDLESEX, GREAT BRITAIN.

PROCESS OF PRODUCING WRITING, &c., ON PAPER, AND THE MANUFACTURE OF PAPER THEREFOR.

SPECIFICATION forming part of Letters Patent No. 243,342, dated June 21, 1881.

Application filed January 18, 1881. (No specimens.)

To all whom it may concern:

Be it known that I, ALFRED FORD, a subject of the Queen of Great Britain and Ireland, residing at 22 Gloucester Crescent, Regent's Park, in the county of Middlesex, Kingdom of Great Britain and Ireland, have invented a certain new and useful Method or Process of Producing Writing and other Marks on Paper, and Manufacture or Preparation of Paper Therefor; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its object a new and useful method or process of producing writing and other marks on paper, and in the manufacture or preparation of paper therefor; and it consists in imparting to paper, by combining therewith certain chemical agents hereinafter described, the property of producing or developing dark lines or marks when and where there is passed over the surface of such paper a pen or instrument moistened with water, or with other liquid not being either a strong acid or an alkali or an alcohol. For this purpose I incorporate with the paper iron and tannin, or its equivalent, as hereinafter defined, in such manner that the iron and the tannin, or its equivalent, shall not combine unless or until moisture is applied, whereupon dark lines or marks will be produced or developed on the paper's surface, such lines or marks corresponding to the extent of surface that has been moistened.

In carrying out my invention I saturate paper suitable for writing purposes with a solution of a salt of iron, which I call "No. 1 solution." I prefer the sulphate or the perchloride of iron, made in the proportion (by weight) of two parts of the salt of iron to one hundred parts of distilled water, or if ordinary water be used it must first be treated with sulphuric acid in the proportion (by measure) of one part of such acid to one thousand parts of water, in order to precipitate any lime which may be present. Commercial sulphuric acid will do. Having saturated the paper by immersing it in the iron solution for a sufficient time (say about ten minutes) I dry it perfectly. I then apply to the surfaces of the paper thus prepared tannin, or its equivalent, by which I mean and include, individually and collectively, each and all of the following—that is to say, tannic acid, gallic acid, and gallo-tannic acid. I prefer tannic acid in a fine state of division, and in a perfectly dry state, either alone or mixed, in the proportion (by weight) of ten parts of such acid to sixty parts of dry wheaten flour and ten parts of dry carbonate of soda. I apply this powder to the surfaces of the said paper by brushing the powder over said surfaces, or gently rubbing it on and afterward dusting off the superfluous powder. This operation imparts to the paper the property of developing ink-marks of a dark color when and where a pen or other instrument moistened, as aforesaid, is passed over the surface, such marks being in all respects as visible and indelible as if made in the usual way on ordinary paper and with ordinary ink; and the property thus acquired by my paper, as the result of this operation, will not be affected by any friction short of destroying the surface. The flour is merely used as a vehicle for the tannic acid, and I may use powdered gum, sugar, starch, or any other suitable vehicle, and I may use, in place of carbonate of soda, potash, lime, or some other alkaline earth.

The proportions I have mentioned may be varied according to the degree of intensity of the marks to be produced. Moreover, the iron and tannin, or its equivalent, may be incorporated with the paper by first saturating the paper in a solution (I call it "No. 2") of tannic acid or gallic acid, or gallo-tannic acid, (or of a mixture of these, or of some of them,) made in the proportion, by weight, of one part of the acid to three hundred parts of water, (ordinary water will do, although distilled water is preferable,) then drying the paper perfectly and afterward applying to its surfaces the salt of iron, mixed in the proportion of ten parts of the salt in a fine state of division, and dry, with sixty parts of dry wheaten flour and three parts of dry carbonate of soda finely powdered, brushing or rubbing such composition over the surfaces of the paper in the manner previously described with reference to the powder containing tannic acid; or I may use any of the other vehicles

for the tannic acid as vehicles for the iron, or I may vary the proportions according to the intensity of the stain or mark I wish to produce. In this method, instead of using tannin, tannic acid, gallic acid, or gallo-tannic acid dissolved in water, I may use a strong decoction or infusion of oak-bark, gall-nuts, oak-apples, poplar, birch, hazel, or any other bark, wood, or vegetable tissue known to contain tannin or any of these acids, having previously discharged from such infusions or decoctions their characteristic color by any of the means well known to chemists for discharging vegetable colors, and saturating the paper in such liquids I may dry it, and treat it with the iron composition in a dry state, as above described, and produce a result not quite so satisfactory, but still sufficient for the purpose.

The iron or the tannin or equivalent may be incorporated with the paper in the process of manufacture. This may be done by saturating the pulp in the iron solution (No. 1 solution) already described, and after the paper has been formed into sheet and dried then applying the dry tannic-acid composition to the surfaces of the paper. Only in this case I apply it preferably by means of felted rollers which are fed with the said composition, the paper being passed through the same and subsequently calendered or finished; or I may employ any other suitable mode of applying this composition to the paper, but I find felted rollers most convenient. The pulp may be first saturated in a solution of tannin, tannic acid, or gallic acid, or gallo-tannic acid, and after the paper is formed and dried the dry iron composition may be applied to it, as in the manner already explained with reference to manufactured paper.

It will be observed that, although various methods of manufacturing the paper are set forth here, the same agents are employed and the same result is obtained.

The object of at one time using the tannin or tannic acid in solution for saturating the paper, and at another time using the iron in solution for saturating the paper, is that one mode agrees with one class of colors and the other with another class, and for this reason it might be convenient to adopt either.

What I claim is—

1. The hereinbefore-described method or process of producing writing or other marks on paper, consisting in imparting to the paper the property of producing or developing (when subjected to moisture) dark lines or marks, and applying to the surface of paper so made or prepared, by means of a pen or other instrument, water or other liquid not being either a strong acid or an alkali or an alcohol.

2. As a new article of manufacture, paper bearing the appearance of ordinary writing-paper, but having within it the elements of ink capable of development by water or other liquid applied to the surface of such paper, substantially as hereinbefore described.

3. The combination, with paper, of iron and tannin, or its equivalent, as hereinabove defined, whereby such paper is rendered capable of producing or developing dark lines or marks by the application of moisture to its surface, substantially as hereinbefore described.

4. As a new article of manufacture, paper containing iron and tannin, or its equivalent, as hereinabove defined, not in combination, but which may, by the application to the paper of moisture, be caused to combine in such manner as to produce on said paper writing or other marks, substantially as described.

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Witnesses:
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