

UNITED STATES PATENT OFFICE.

EUGENIO DE ZUCCATO, OF PADUA, ITALY.

IMPROVEMENT IN PROCESSES OF PRODUCING FAC-SIMILE COPIES OF WRITINGS, &c.

Specification forming part of Letters Patent No. **157,161**, dated November 24, 1874; application filed June 27, 1874.

To all whom it may concern:

Be it known that I, EUGENIO DE ZUCCATO, of Padua, in the Kingdom of Italy, and temporarily of Frith street, Soho, in the county of Middlesex, England, a subject of the King of Italy, have invented or discovered new and useful Improvements in Producing Fac-Simile Copies of Writings, Drawings, and Delineations; and I, the said EUGENIO DE ZUCCATO, do hereby declare the nature of the said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof—that is to say:

My invention has reference to the employment of chemical agency in producing fac-simile copies of writings, drawings, and delineations, in manner hereinafter described.

In the first place it is requisite to obtain a thin sheet of paper close in texture, and which has been highly sized and well rolled, and is of the substance or thickness generally known in commerce as "bank post." Other kinds of paper may prove a substitute, but I recommend as being best adapted for the purpose of my invention the use of such paper as I have described. In the next place the sheet of paper before described should upon one side be entirely covered or coated with an impermeable or water-proof substance, such as resin dissolved in spirits of wine or oil of turpentine; and I recommend as being best adapted for the purposes of my invention the composition known in commerce as "gilder's lacquer," to which I usually add to every three parts of the same one part of methylated spirit for the purpose of making the lacquer to flow more freely and evenly during the operation of coating; and in order to render the composition softer I add Venice-turpentine in the proportion of one-sixteenth part of the whole. These proportions, however, may vary according to the substance or quality of the lacquer and the quality of paper used. The ingredients, when mixed, must be allowed to be thoroughly dissolved and united before being used. This varnish must be laid on the paper evenly, which can be most conveniently done by means of a broad and soft brush; and I recommend that this operation should be repeated twice or three times, according to the

consistency of the varnish and the quality of the paper. The paper, when so coated, must be thoroughly dry before being used. I recommend that sheets of paper thus prepared, should be kept ready for immediate use. I shall in future refer to the paper so prepared, when describing my process, as "papyrographic paper." In the next place, upon the uncoated side of a sheet of papyrographic paper prepared in the foregoing manner and being perfectly dry, the writing, drawing, or delineation of which fac-simile copies are intended to be produced should be executed with an ordinary steel pen, using for ink the liquid preparation hereafter described, and which writing must be allowed to dry.

The liquid preparation I employ for executing such writing, drawing, or delineation consists of a caustic preparation, such as water which has been saturated with hydrate of sodium or hydrate of potassium; which preparation may be colored with a suitable coloring matter, such as vandyke-brown or other coloring matter capable of withstanding the action of the alkali, and which matter will not neutralize the caustic properties of the preparation. This preparation I shall in future, when describing my process, allude to as the "papyrographic ink."

In the next place, in order that the papyrographic paper which has been written, drawn, or delineated upon with papyrographic ink may be used for producing fac-simile copies, it is necessary to remove those parts of the varnish that have been acted upon or corroded by the action of the said ink. This removal may be made in several ways; but I recommend the following method, namely: Upon a pad of textile fabric, such as calico or linen that has been saturated with clean water, the coated side of the written papyrographic paper is to be placed, and is to be firmly and evenly pressed down, first covering it with a sheet of blotting-paper, the writing side being uppermost. The water from the pad will within a few minutes commence to ooze through the lines of the writing, drawing, or delineation, and the moisture appearing on the uncoated surface should be immediately removed by means of the blotting-paper before alluded to, in order to stay any lateral action of the papyrographic

ink. This process should be continued until all the lines of the writing are perfectly clear, which is a certain indication that the ink has operated sufficiently. The papyrographic paper may now be removed from the saturated pad, and any portions of corroded varnish that still remain may be washed away with a soft brush. I suggest that the position of the papyrographic paper be occasionally changed while on the wet pad. The effect produced by the washing before described is to remove such portions of the varnish as have been acted upon or corroded by the action of the papyrographic ink along the lines of the writing, drawing, or delineation which have been made. It is next necessary to form a pad composed of a few sheets of blotting-paper, which must be cut slightly larger than the space occupied by the writing, drawing, or delineation that has been executed on the papyrographic paper, while it must be smaller than the area of the said papyrographic paper, which must extend beyond the edges of the pad. The pad must be then evenly moistened with a solution of persalt of iron, and I recommend as best adapted for the purposes of my invention a solution of persulphate of iron—that is, the liquor ferri-persulphatis of the apothecary, hereafter called the “papyrographic-pad solution.”

Having prepared the papyrographic paper and executed the writing, drawing, or delineation upon the uncoated side and washed the same, as before described, and having prepared the papyrographic pad, evenly moistened with the papyrographic-pad solution, it remains to prepare the paper upon which the fac-simile copies are desired to be produced. For this purpose any ordinary writing or printing paper is more or less suitable if previously damped with a solution prepared as next described, and which I denominate the “papyrographic-printing solution.” This preparation is composed of a saturated solution of ferrocyanide of potassium or yellow prussiate of potash of commerce, in the proportion of one part of saturated solution of prussiate of potassium to eleven parts of water. It is not, however, essential that this exact proportion should be observed; but I have in my experience found that a solution of this strength is very suitable for my process.

Having prepared the papyrographic pad, the papyrographic paper bearing the writing, drawing, or delineation desired to be copied, and the paper damped with the papyrographic-printing solution, the mode of producing the fac-simile copies of the writing, drawing, or delineation which has been executed upon the papyrographic paper is as follows: Place the papyrographic pad, moistened or damped with the papyrographic-pad solution, upon a perfectly-flat surface, such as a piece of pasteboard or wood, and flat upon the surface of the pad place the papyrographic paper, so that the uncoated side thereof, upon which the writing, drawing, or delineation has been executed, may

be next to the pad, and the coated or varnished side uppermost; and then, if the papyrographic paper be dry, moisten it with clean water, in order to give an absorbing power to the exposed lines of the writing, drawing, or delineation. Flat upon the surface of the papyrographic paper put a piece of dry blotting-paper, and upon the top of the whole thus arranged place another piece of pasteboard, or perfectly-flat piece of wood or metal, and press the whole together in an ordinary letter-copying press, or some modification thereof. After a few seconds the exposed lines of the drawing, writing, or delineation will be found impregnated with the papyrographic-pad solution. For the dry blotting-paper is then substituted a sheet of blotting-paper damped in the papyrographic-printing solution, which, upon being pressed against the papyrographic paper in the manner hereinbefore described, will be found to bear in a blue color an exact fac-simile or copy of the writing, drawing, or delineation made upon the papyrographic paper. Care must be taken that the pressure is evenly distributed as far as possible.

When a sheet of the paper to be printed upon, already previously damped with the papyrographic-printing solution, is substituted for the damp blotting-paper, upon being treated in a similar manner to that of the blotting-paper damped in the papyrographic solution before alluded to, it will be found, on taking it off, that a fac-simile copy of the writing, drawing, or delineation made upon the papyrographic paper has been produced upon it in a blue color. Without disturbing the arrangement of the pad and papyrographic paper, a fresh sheet of the paper to be printed upon can be placed upon the papyrographic paper in the place of the sheet that has been printed, and, upon submitting it to pressure in the manner before described, it will be found that a second copy has been produced, and by continuing the process a great number of copies can be successively obtained by using other sheets of paper damped with the papyrographic-printing solution.

The action that ensues is as follows—that is to say: The solution of persulphate of iron, called the papyrographic-pad solution, with which the papyrographic pad is moistened, being separated by the intervening sheet of papyrographic paper, bearing the writing, drawing, or delineation to be copied from, and the solution of prussiate of potash, called the papyrographic-printing solution, with which the paper to be printed upon is damped, are able to come into chemical combination by means of the pressure exerted by the press through the exposed parts of the papyrographic paper along the lines of the writing, drawing, or delineation where the papyrographic paper has been already acted upon or corroded by the action of the papyrographic ink, as before described. The production of a blue color results from the contact of the two solutions, so that a writing, drawing, or delineation in blue

color is obtained upon the paper damped with the papyrographic-printing solution exactly corresponding and fac-simile to the writing, drawing, or delineation already executed on the papyrographic paper.

By varying the solution used for damping the papyrographic pad upon which the papyrographic paper is placed, or the solution used for damping the paper to be printed upon, or both these solutions, fac-simile copies in other colors well known to chemists may be obtained in like manner as before described with respect to the use of the chemical solutions before mentioned.

When it is found more convenient, the process may be slightly varied in detail.

The chemical papyrographic pad and paper to be printed upon, or either of them, may be manufactured beforehand, and saturated with the prescribed solutions and dried, so that when required to be used they may be both, or either of them, simply moistened with plain water or their respective chemical solutions.

Instead of writing, drawing, or delineating upon the papyrographic paper, the operator can write, draw, or delineate upon a plain

sheet of blank post paper before it is coated, and when the papyrographic ink is dry the paper can be coated with varnish on one or both sides, proceeding afterward, when dry, to wash the paper so treated and print the copies, as before described.

Having thus described my invention, and the means of carrying it into effect, I would have it understood that I do not limit myself to the chemical substances specially named, nor to the proportions stated, as there are well-known equivalents which will produce similar results, although not so good.

What I claim, therefore, as of my invention is—

The process of producing fac-simile copies of writings, drawings, and other delineations, in the manner and by the means substantially as hereinbefore described and set forth.

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