313,245

UNITED STATES PATENT OFFICE.

FRANÇOIS SCHMALZ, OF NEW YORK, ASSIGNOR TO CHARLES V. PEYN, OF BROOKLYN, N. Y.

METHOD OF MANUFACTURING CLOCK AND WATCH DIALS.

SPECIFICATION forming part of Letters Patent No. 313,245, dated March 3, 1885.

Application filed August 13, 1884. (No specimens.)

To all whom it may concern:

Be it known that I, FRANÇOIS SCHMALZ, of the city and State of New York, have invented an Improvement in the Manufacture of Watch and Clock Dials, of which the following is a specification.

The best qualities of clock and watch dials are divided and lettered by hand, the lines being made with a paint that will vitrify and adhere under the action of heat to the porcelain of the face. This operation requires skilled workmen, and is often imperfectly performed and inaccurate.

My improvement relates to a method of applying to the face the paint that is united thereto by the action of heat, a photographic operation being employed for transferring the divisions and figures from a glass plate prepared with great accuracy, and which can be used as the original in the production of an indefinite number of copies. The dial when complete corresponds in all particulars with the most perfectly-produced dials made by hand.

In carrying out my process I proceed as follows: Upon a plate of glass free from flaws or imperfections I draw with great care the marks, figures, numbers, and divisions composing the dial that is to be reproduced. This is to be done in ink or paint that is absolutely black and opaque, and it is preferable to have these lines slightly in relief. The drawing is protected by a thin layer of transparent varnish, and it becomes the pattern or negative in the print for the dial. I employ a flat plate of metal that is thin and highly polished, and with a clean surface of nickel or silver, and apply to the same a sensitized surface composed of a solution of one and one-half ounce of bichromate of potash, three-quarters of an ounce of sugar, three-quarters of an ounce borax, and one-quarter of an ounce glycerine, thoroughly mixed in twelve ounces of water, or in about that proportion, the same being filtered to remove any undissolved or foreign matter.

In cleaning the plate I prefer to use ammonia to remove any greasy particles, after which the surface is covered with some of the solution aforesaid to sensitize the same, and it is given a rotary movement to equalize the film, and warmed and dried beneath a gas-jet. I now press the sensitized surface of the plate against the glass and expose the same to the action of light, as in photographic printing. The period of exposure will vary with the intensity of the light. Sunlight or an electric light may be made use of. I provide a black enamel of a character corresponding to that which is now made use of in the manufacture of watch and clock dials, but the same is in a dry and finely-powdered condition. After the sensitized surface has been exposed to the action of light, and separated from the negative or glass plate, this enamel is brushed over the surface and will adhere to the portions of the surface from which the light has been excluded, but it will not adhere to the portions of the surface which have been decomposed by the action of the light. The enamel, in powder, is supplied in sufficient quantity to entirely cover the undecomposed surface, after which finely-powdered flint glass and borax are brushed over the print to remove any particles of the black enamel that may adhere to the decomposed portions of the surface.

I provide a solution of collodion made in the following manner: One part sulphuric ether, one part of alcohol, one-tenth part of gun-cotton, and add to the same from four to ten drops of castor-oil for each pint of the preparation. I pour over the print, prepared as aforesaid, the said collodion, and allow it to dry. The coloring-matter composed of the fine particles of black enamel now adheres to the collodion, and by washing the plate under a jet of water the collodion will be separated, and I now lay upon the collodion a frame of paper with an opening in it rather larger than the size of the dial, and loosen the edges of the collodion and turn them back upon the frame, and by means of the frame lift the film of collodion off the plate, and with it the particles of black enamel, and transfer the same to the dial having a white vitreous surface, and the collodion adheres thereto and holds the particles of enamel forming the divisions and figures directly upon the dial. The dial is now exposed to the necessary heat to cause the enamel to adhere, and in so doing the collodion is consumed and the dial is completed.

I do not claim a film of collodion to transfer a paint or ink from an engraved surface to a dial, as this has been used; but the paint un-

der the action of the firing spreads, and the lines cease to be clear and sharp.

By the use of a pigment in the form of a fine powder and upon a sensitized surface, I am able to apply a perfect but very thin layer to the dial, so that when fired the lines will be sharp. Any pigment in the form of a fine powder that will adhere to the sensitized surface and will melt into or with the enamel of the dial in firing may be used, the same possessing the necessary vitreous properties.

I do not claim the transfer of photographic pictures or ornaments to porcelain or glass by means of a film of collodion. In instances where this has been attempted the collodion and coloring-matter required an adhesive material to attach the same to the porcelain surface, and the collodion had to be dissolved and removed before firing. By my improvement I am able to dispense with both these operations, and to transfer the vitreous powder direct to the watch or clock dial, so that the figures and divisions are sharp and clear and no foreign substance remains on the dial after firing.

I claim as my invention—

The method herein described of manufacturing watch and clock dials, consisting in printing upon a sensitized surface the divisions and figures, developing the same by a vitreous pigment in a finely-powdered form, pouring upon such sensitized surface collodion which adheres to the pigment, removing the collodion and pigment, transferring the same to the dial with the pigment directly upon the dial, and vitrifying the pigment and removing the collodion by heat, substantially as set forth.

Signed by me this 7th day of August, A. D. 1884.

FRANÇOIS SCHMALZ.

Witnesses:
GEO. T. PINCKNEY,
WILLIAM G. MOTT.