

# UNITED STATES PATENT OFFICE.

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PREPARING SURFACES FOR ETCHING AND IN ETCHING SUCH SURFACES.

SPECIFICATION forming part of Letters Patent No. 706,280, dated August 5, 1902.

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*To all whom it may concern:*

Be it known that we, FRANCIS H. THIBODO and SEBASTIAN S. PECKINPAUGH, citizens of the United States of America, residing at Greenbay, county of Brown, and State of Wisconsin, have invented certain new and useful Improvements in Preparing Surfaces for Etching and in Etching Such Surfaces; and we do hereby declare the following to be a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to apply the same.

Heretofore the methods applied by the agency of photography for producing photo-etching on glass plates have only been partially successful, the general character of the work being such that all the lights and shadows were not brought out in detail.

The object of our invention is to provide a process of etching which shall be simple and easily carried out and which shall be cheap and by which large and small surfaces of glass, steel, copper, zinc, and almost any hard material of smooth surface may be successfully and satisfactorily etched with an exact reproduction of a photographic negative with all the gradations of light and shadow.

It will be seen by this specification that the time of etching by this process is of shorter duration than all former processes, which is in itself a great benefit and improvement.

It will be seen from this specification that our method of preparing and etching is an improvement in many ways from former methods of preparation and etching and that by the use of the herein-described method it is not applicable for etching designs, &c., as in former methods of etching on glass, &c.

To carry out our invention, the material to be etched—glass or such other material suitable, steel, copper, or zinc, &c.—is coated with a solution of albumen, one ounce; water, three ounces; ammonia, ten drops; chrome-alum, three drops of a solution consisting of chrome-alum ten grains and water one ounce; bichromate of ammonia, twenty grains. After receiving the above coat the plate is then dried in subdued light and is then taken and

exposed to the light. If the plate to be etched coated with the above solution is a material subject to actinic rays, as glass, this exposure to the light should be made so that the actinic rays reach the coating through the glass, which will cause the coating to adhere more closely to the plate. If the plate used as above stated be steel, copper, zinc, or other opaque substance, the light is allowed to strike directly on the coating specified above. This exposure to the light is made to render the said coating insoluble. Prepared carbon tissue, which is known as "carbon tissue," "carbon-paper," or "autotype-paper," being a patented article of paper coated with gelatin and containing any shade of pigment, after being sensitized in the usual manner for such paper is exposed under negative for a time sufficient to make a strong print and is then placed upon the surface to be etched, which is that side of the plate of glass, steel, copper, or zinc which has been coated with the solution above mentioned, and this carbon tissue after being so placed should be pressed down firmly, so as to adhere to the coating, and is then developed by placing the plate in a developing-pan holding a bath of hot water. After developing the thick backing of the carbon tissue being loosened is removed by taking hold of a corner and pulling said backing from the plate. This will leave the developed carbon tissue adhering to the coating of albumen, water, ammonia, chrome-alum, and bichromate of ammonia heretofore mentioned. The carbon tissue so adhering is then dried by heat or evaporation. The plate is now ready for etching after being warmed. Hydrofluoric gas is generated in a deep metal dish or box, preferably one with an opening at the top of such size that the plate to be etched will just cover this opening. The plate to be etched is then placed with the prepared side down, thus allowing the hydrofluoric gas to attack only the surface so prepared. The coating which has been placed upon this prepared plate has by its exposure to the light, as specified hereinbefore, become insoluble, and the carbon tissue having been developed upon said coating is of



such texture as to allow the hydrofluoric gas to penetrate, (only where the light has not acted on the carbon tissue when exposed under the negative,) thus allowing the hydrofluoric gas to cut the plate and from the nature of the coating first mentioned and the carbon tissue causes the plate to assume where the hydrofluoric gas acts upon it an etched appearance. If the plate be glass, it will assume an etched and whitish or frosted or ground-glass appearance. When sufficiently etched, remove and wash with water, thus completing the process. When the plate to be etched is other than glass, the prepared surface is flowed with any acid which will attack and etch it.

The object of the coating of albumen, water, ammonia, chrome-alum, and bichromate of ammonia is to form a medium for holding the carbon tissue on the surface to be etched when placed so that the hydrofluoric gas will act on same, and without said coating the carbon tissue would not adhere to the surface to be etched, but would peel off. Also the coating above mentioned is of such consistency that when used in the manner above specified on a glass plate will when the plate is exposed to hydrofluoric gas cause it to assume an etched or frosted or ground-glass appearance.

Having thus described our invention, what we claim as new therein, and desire to secure by Letters Patent, is—

1. In the art of etching glass, or similar substances, the process which consists in covering one surface of a sheet of glass with a coating composed of albumen, water, ammonia, chrome-alum and bichromate of ammonia in the proportions specified; in then drying this coating in subdued light; in passing actinic rays through the glass into the coating; in then developing sensitized and exposed carbon tissue on this coating; in then subjecting the sheet of glass to the action of hydrofluoric gas, eroding the surface of the glass; and in then removing the remaining portion of the coating.

2. In the art of etching glass, or similar substances, the process which consists in covering one surface of a sheet of glass with a coating composed of albumen, water, ammonia, chrome-alum and bichromate of ammonia in the proportions specified; in then drying this coating in subdued light; in then exposing this coating to the light; in then developing sensitized and exposed carbon tissue on this coating; in then eroding the surface of the plate on which the coating is placed to a depth varying with the protection afforded by the coating; and in then removing the remaining portion of the coating.

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In presence of—

C. W. LOMAS,

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