

# UNITED STATES PATENT OFFICE.

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## METHOD OF ORNAMENTING GLASS.

SPECIFICATION forming part of Letters Patent No. 415,229, dated November 19, 1889.

Application filed March 13, 1889. Serial No. 303,151. (No specimens.)

*To all whom it may concern:*

Be it known that we, BENJAMIN C. TILGHMAN and RICHARD A. TILGHMAN, both of the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improved Method of Ornamenting Glass, of which the following is a true and exact description.

Our invention relates to a method of ornamenting glass by first grinding the surface to make it opaque and then removing portions of the ground surface by the action of fluoric acid, so as to produce figures of clear glass in a ground or frosted glass, or vice versa. In attempting to carry out this method by means of the sand-blast we have found that the grinding of the surface requires a long time, but a moderately fine surface being obtained by the use of the finest possible dry sand and a very low pressure of the blast, while any attempt to increase the rapidity of action by using a more powerful blast results in making the surface more coarse, and even the finest surface procured by the use of dry sand is too coarse to be entirely removed by the fluoric acid, so that after exposure to its action the surface is still found to lack the clearness and brilliancy which are essential to good decorative work of this kind.

The object of our invention is to increase the rapidity of the treatment, and at the same time to secure a ground surface of the finest possible character, so that such portions of it as are removed shall present a clear and brilliant surface, and this we accomplish by using sand of any kind (or emery or any other hard substance) in the form of a fine powder, (preferably as fine as flour,) mixing this powder with water or other liquid to form a fluid mud, and propelling this mud against the object to be ground by a jet of steam, air, or gas at considerable pressure. This finely-powdered cutting material or sand cannot be used in a dry state, as it will not flow, but because of its relatively very large frictional surface clings together, so that it will stand in a ver-

tical wall or even arch over. By mixing it with water, however, it flows regularly and can be fed or sucked into a blast in a stream of regulated quantity. The surface of the glass against which this stream of mud is directed is found to be ground in the finest possible manner, and as a blast of high power can be used without danger the grinding action requires but a very short time.

Having produced a finely-ground surface in the way above described, we next apply to it a protecting-film of any substance which will resist the action of fluoric acid, arranging it in any desired pattern. Preferably we apply the pattern-film by the well-known transfer process. After the film is secured upon the ground or frosted surface we expose the glass to the action of fluoric acid until the unprotected parts become transparent.

By the term "fluoric acid" we intend to include any of the mixtures of fluoric acid or of the fluorides with other substances commonly used in the art of ornamenting glass. By "sand" we mean any finely-comminuted hard substance capable of use in the sand-blast apparatus, and by "blast" we mean any rapidly-moving current of air, gas, or steam, steam being preferably employed.

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

The method of ornamenting glass, which consists in grinding its surface with exceedingly-fine sand mixed with water and propelled by a blast, then covering portions of the ground surface with a film impervious to fluoric acid, and exposing the unprotected surface to fluoric acid, so as to remove the ground surface and produce a bright surface of the desired pattern.

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Witnesses:

GEORGE HOUSE,  
FRANCIS T. CHAMBERS.