(Specimens.)

F. S. TOMEY.

MANUFACTURE OF THERMOMETER TUBING.

No. 568,591. Patented Sept. 29, 1896.

Fig. 1.

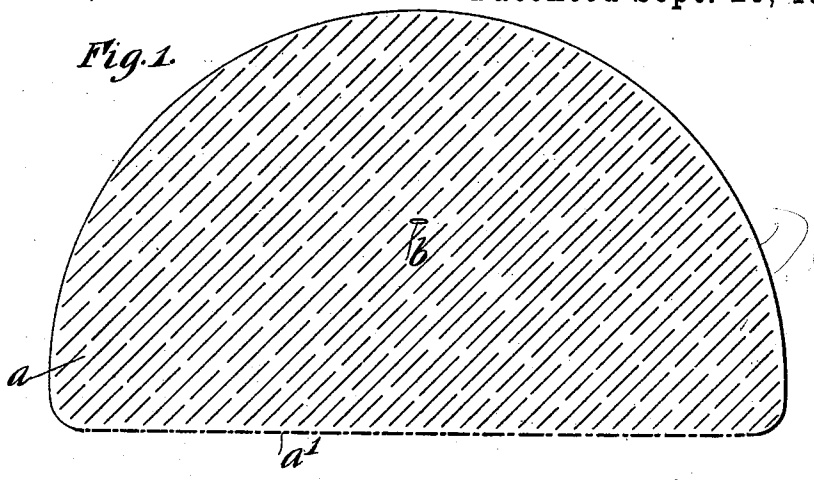
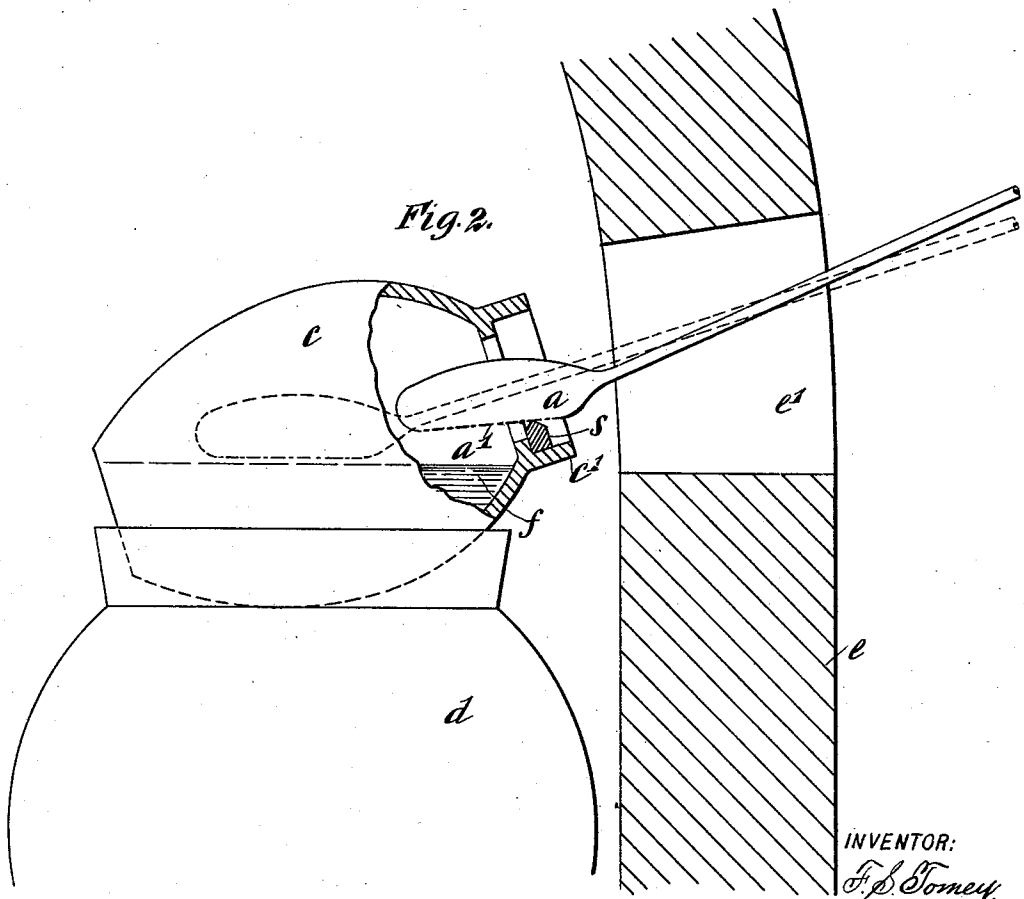


Fig. 2.



WITNESSES.

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FRANCIS SAMUEL TOMEY, OF BIRMINGHAM, ENGLAND.

MANUFACTURE OF THERMOMETER-TUBING.

SPECIFICATION forming part of Letters Patent No. 568,591, dated September 29, 1896.

Application filed August 3, 1895. Serial No. 558,109. (Specimens.)

To all whom it may concern:

Be it known that I, FRANCIS SAMUEL TOMEY, glass-tube manufacturer, of 142 Victoria Road, Aston, Birmingham, in the county of Warwick, England, have invented a new and useful Improvement in the Manufacture of Thermometer-Tubing, of which the following is a full, clear, and exact description.

This invention relates to the manufacture of tubing for clinical, chemical, and other thermometers that are intended to have the graduations and figures of the thermometric scale etched upon the rear of the stem, so as to be visible when viewed through the stem, upon an enamel ground behind the bore. With this object in view it has long been desired to draw the tube with a very thin external coating of enamel applied, preferably, upon a flat surface, which when the thermometer is finished would form the back of the stem and upon which surface the scale would be marked by etching through the enamel. A thermometric scale so produced would be practically indestructible, since, the divisions and figures being etched through the enamel, the scale would be visible even should all the black filling be removed by acids or by cleaning. It has not, however, been possible to produce commercially and by the ordinary methods of manufacture enameled thermometer-tubing suitable for the purpose of being so etched, owing to the impossibility of applying a sufficiently thin coating of enamel to so extended a surface as that of what is known in the trade as the "piece." The ordinary method of applying the enamel is to gather the required quantity onto a pontil and flatten it, then to warm it again at the pot-mouth, and while very hot to apply it in the required position; but experience has heretofore shown that when the enamel has been flattened thin enough for the desired purpose it has invariably run into corrugations immediately upon being exposed to the heat preparatory to being applied to the required position on the piece, to which it never could be applied without air-blisters being left between itself and the flint "metal" and without such unevenness in the thickness of the coating of enamel as to cause it to break while being drawn out. Even were it found possible to apply a sufficiently thin coating of enamel to the piece and that the piece so coated were drawn out in the form of a thermometer-tube, the thickness of the enamel has unavoidably been so variable as to render impossible the proper performance of the etching operation, inasmuch as it is not practically possible to obtain sufficient action of the acid to produce the required depth of etching on the parts where the enamel is thick and yet prevent excessive action of the acid where the enamel is thin.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a cross-sectional view of the piece; and Fig. 2 is a broken elevation, partly in section, of the furnace containing the enamel-pot and illustrating the manner of applying the enamel.

a is the piece, having a bore *b* and a flat face on which is applied the coating of enamel designated *a'*.

In Fig. 2, *c* is the enamel-pot, located upon a suitable support *d* and provided with an open neck *c'*, disposed toward an opening *e'* in the wall *e* of the furnace. A scraper *s* is arranged in the mouth of the enamel-pot, said scraper being beveled to a true knife-edge and is made smooth and polished after grinding.

To overcome the difficulties inherent to the above-described usual process of making thermometer-tubing, I blow the ball and form the bore in the usual way, omitting, however, the enamel. I then cover the ball with metal to the required thickness and marver it to a cylindrical form. Then, having reheated it, I carefully flatten the back of the piece *a* upon a marver or other suitable surface. I then dip the piece carefully into the fluid enamel *f*, contained in the pot *c*, taking especial care to prevent contact of the enamel with any but just the flattened surface of the piece, and having allowed the enamel to drain off I carefully draw the flat surface of the piece over the knife or scraper *s* (fixed in the mouth *c'* of the enamel-pot) before the enamel on the piece has had time to become chilled in the slightest degree. All the superfluous enamel is thus removed from the coated flat side of the piece, the enamel coating being left in the form of a perfectly flat film of absolutely uniform thickness and free from

blisters. The piece is then marvered and heated and drawn out into the form of thermometer-tubing in the usual way.

It is to be observed that the enamel in which the piece is thus dipped must be very hot and as fluid as possible and must be of such a composition that its coefficient of contraction and expansion under variations of temperature will be the same as that of the flint metal of which the piece is made.

I claim—

The herein-described method of manufacturing enameled tubing for thermometers which are to have the scale etched through the enamel, which method consists in forming a piece flattening the back thereof, dipping the flattened surface into molten enamel, then scraping off the superfluous enamel while it is still hot and fluid, so as to leave a film of enamel of uniform thickness on the back, and finally drawing the enamel-coated piece into thermometer-tubing, substantially as described.

Signed by the said FRANCIS SAMUEL TOMEY.

FRANCIS SAMUEL TOMEY.

In presence of—
JAMES CLEWS,
JOSEPH BENJAMIN FREEMAN.