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H. M. PAINE.

Lens Perfector.

No. 4,786. Patented Oct. 3, 1846.

Fig: 1

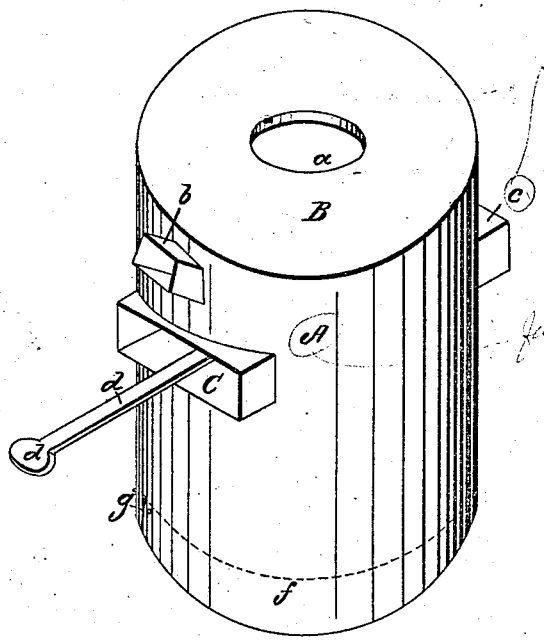


Fig: 5.

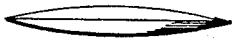


Fig: 4.

Fig: 3.

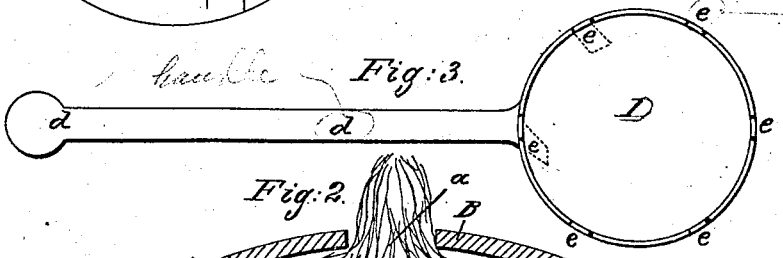
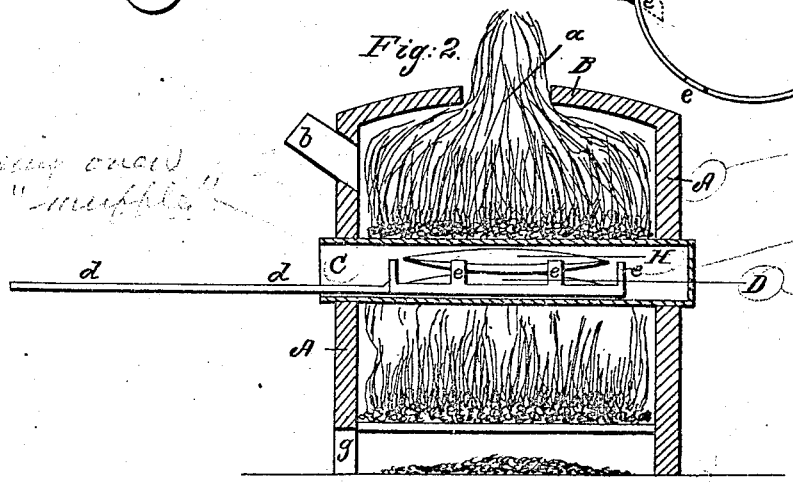


Fig: 2.



UNITED STATES PATENT OFFICE.

HENRY M. PAINE, OF NORTH OXFORD, MASSACHUSETTS.

GLASS LENS.

Specification of Letters Patent No. 4,786, dated October 3, 1846.

To all whom it may concern:

Be it known that I, HENRY M. PAINE, of North Oxford, in the county of Worcester and State of Massachusetts, have invented a new and useful apparatus, which I call a "lens-perfector," and a "Process," by means of which apparatus and process any required parabolic form or curvature may be given to lenses; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1, is a perspective view of the fusing furnace. Fig. 2, a transverse open view of the furnace, as if cut down through the center, showing the interior of the fusing oven—the fire—the curvator—the lens, &c., in operation. Fig. 3 is the curvator. Fig. 4, is a convex lens. Fig. 5, is the same lens as that in Fig. 4, after the process herein described by which it assumes the required parabolic curvature.

Fig. 1. The furnace is constructed of brick as exhibited in Fig. 1, (A) with a top or cover of cast iron (B) which has an aperture (*a*) which serves as a chimney. C, C, are the projecting ends of the fusing oven which is open at each end and passes through the furnace (*b*) is the hopper or place for introducing the fuel. (*g*) an air door to regulate the draft and remove the ashes. (*f*) upon the dotted lines shows the position of a common grate.

In Fig. 2, the same letters are applied to the same parts as in the last figure (A) being the edge of the brick furnace, (B) the cast iron cap or cover, (*a*) the chimney, (*b*) the hopper for supplying fuel—a part of which remains ignited upon the fusing oven and as much as required is removed with a poker through the hopper, and made to fall on the right and left of the fusing furnace upon the grate (*f*) below. C, C, exhibits the interior of the cast iron fusing oven, with the instrument called the "curvator" (D) and guides (*e*, *e*, *e*, *e*,) and handle (*d*, *d*,). Upon the convex "curvator" is shown a lens (H) held in its position by the guides (*e*, *e*, *e*, *e*,) and exposed to the heat until it shall be sufficiently fused to assume upon its under side, the exact form of the "curvator" upon which it rests.

Fig. 3, is a view of the "curvator," (D) being a convex plate of platina, of the diameter required for the lens to be perfected (*e*, *e*, *e*, *e*, *e*, *e*,) are the guides, also of platina, to hold the lens in its place, or a hoop may be used in their place, (*d*, *d*,) is the handle of the "curvator" which may be of iron or steel and protected with clay.

(H) in Figs. 2 and 4 is the lens before being fused—while (H) in Fig. 5, shows the lens when perfected with the parabolic curvature.

Operation: A double convex lens of the required focal length, is ground in the usual manner one surface being left unfinished or in the state in which it comes from the emery lap. The unfinished surface is placed upon the convex instrument of platina called the "curvator"—(this convex surface of platina is ground to a required convexity and should be of the same diameter as the lens that is to be perfected.) The circumference of the lens is now surrounded with a band on the guides (*e*, *e*, &c.) in sections which keep the lens in its place. The coals in the furnace being now ignited—the "curvator" (with the lens resting upon it as described) is taken by the handle and placed in the center of the fusing oven (which is of cast iron and of sufficient size only to receive the curvator and lens). The oven is kept at a temperature sufficiently high to fuse the lens without causing it to flow the center of the lens, being supported by the center of the curvator the other parts of the lens as they become fused are compelled by their own weight to fall on the surface of the convex curvator and thus the under or unfinished side assumes the curve of the curvator while the upper or finished surface will assume that of a parabola whose curve or departure from a circle will be according to the radius of the convex surface of the curvator and lens. The lens having thus received or taken its proper form is passed to the usual annealing oven and when properly annealed the concave side is finished on the ordinary convex lap.

As there is an optical law which governs the radius of the concave surface of parabolic or elliptic lenses, the surface of curvators is ground in conformity thereto, and as the focal lengths and diameters of lenses vary, so must the size and curvature of the curvators.

The curvator is not necessarily confined to a convex surface. If made in any required concave form, and a double concave lens be

placed upon its surface the lens under the action of heat will assume a parabolic form on one surface and a spherical convexity on the other, and thus any curvature may be obtained by altering the form of the curvator or varying the radius of the two surfaces of the lenses.

What I claim as my invention and desire to secure by Letters Patent is—

1. The combination of the furnace and fusing oven in the manner described.

2. The construction of the "curvator" with its guides, substantially as herein set forth.

3. The process by which any required parabolic form or curvature, may be given to the lens as herein set forth in detail.

HENRY M. PAINE.

Witnesses:
JULIUS L. CLARKE,
GRENVILLE PARKER.