

F. A. STEVENS.
METHOD OF MAKING BIFOCAL LENSES.
APPLICATION FILED MAR. 2, 1908.

901,659.

Patented Oct. 20, 1908.

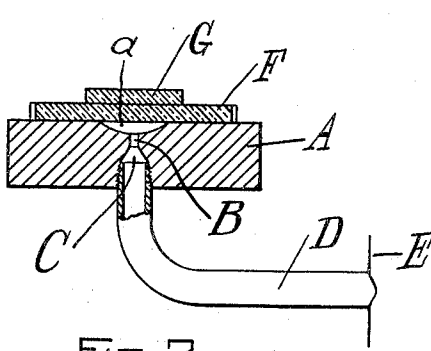


FIG. 2.

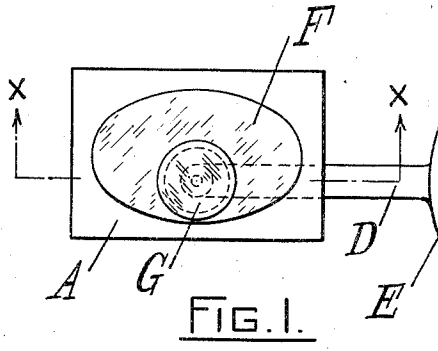


FIG. 1.

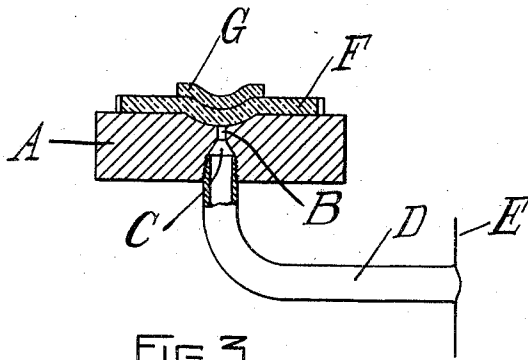


FIG. 3.



FIG. 4.

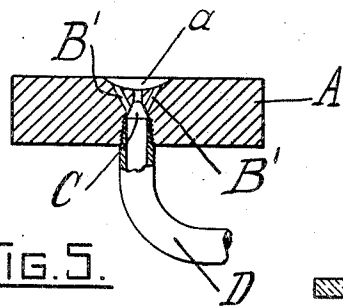


FIG. 5.

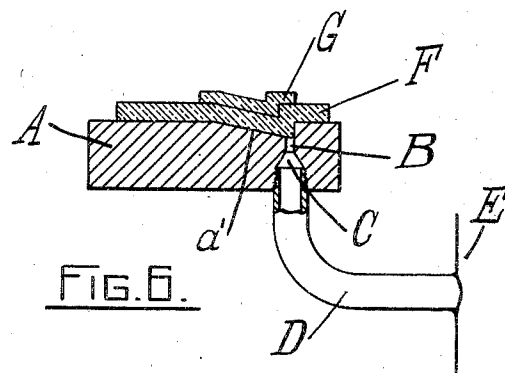


FIG. 6.



FIG. 7.

WITNESSES.

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METHOD OF MAKING BIFOCAL LENSES.

No. 901,659.

Specification of Letters Patent.

Patented Oct. 20, 1908.

Application filed March 2, 1908. Serial No. 418,704.

To all whom it may concern:

Be it known that I, FREDERICK A. STEVENS, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Methods of Making Bifocal Lenses, of which the following is a specification.

My invention relates to methods of uniting glass blanks, and is particularly adapted to the manufacture of bi-focal lenses.

Heretofore, it has been customary to grind and fit the face of one or both blanks preparatory to uniting, and either cement or fuse one of these blanks into the ground surface of the other. The labor, skill, and expense involved in the grinding method is excessive; and the variety in surface and sectional contour of the embedded member is limited.

To the end essentially of overcoming the enumerated disadvantages, my invention consists in the steps and operations hereinafter set forth and pointed out in the claims.

In the accompanying drawings which constitute a part of this specification, Figure 1 is a plan view of a device or apparatus in conjunction with which my process may be carried out, supporting two superimposed glass blanks intended to be operated upon. Fig. 2 is a section on line $x x$ of Fig. 1. Fig. 3, a like section of the parts at a succeeding stage of construction. Fig. 4, a similar section of the completed product. Fig. 5, a section of a modified form of die taken upon the section indicated in Fig. 1. Fig. 6, a like section of another modified form of die and superimposed parts after the fusing process, and Fig. 7, a similar section of the completed product made in conjunction with the modified form of die shown in Fig. 6.

Like reference characters indicate like parts throughout the views.

My process is illustrated in this instance as performed upon two blanks intended for use in the construction of bi-focal lenses. In connection with my process, in this instance, is provided a metal block or die, A, provided in its upper face with a cavity, a , shown in Figs. 2 and 3, as concave, from whose lowest point is a vertical duct, B, extending into a larger opening, C, which receives the end of a pipe, D, leading to an air pump, E. A portion of the pipe, D, is shown broken away in Figs. 2, 3, 5 and 6. In Fig. 5, a plurality of ducts, B', are shown. In connection with the production of prismatic effects the form

of die cavity, a' , as shown in Fig. 5, is desirable. In short, as will be later evident, the die cavity, a , may be annular or of any desired outline best adapted to use in any particular class of work; furthermore, the number of the die cavities may be increased when desired, as in the case of the manufacture of lenses having more than two foci. The block, A, preferably rests in a muffler, or has sufficient heat applied thereto in any convenient manner to moderately raise its temperature.

My process, when performed in conjunction with the described devices, is as follows: The two glass blanks, F and G, intended for treatment are assembled one upon the other. The blank, G, being the upper of the two. In this case, F represents a lens blank, and G a smaller or auxiliary blank resting thereon, having a refractive index differing from that of blank, F, and fusible at a lower degree of temperature than the latter. It is sometimes desirable to unite the assembled blanks before being operated upon; in which case the temperature of the blanks may be raised sufficiently to fuse their contacting surfaces. It is preferable, but not essential, that the blanks be allowed to cool before proceeding. The blanks thus assembled, with blank F below blank G, are subjected to sufficient heat to render both blanks plastic, and placed upon the block, A, whereupon the air is exhausted by pump, E, from the cavity, a , through the duct, B, and pipe, D, thereby forcing by atmospheric pressure or suction the compound blank down into the cavity as shown in Figs. 3 and 6. After cooling, the blanks thus welded are removed and their projecting upper and lower faces ground to complete the desired lens.

What I claim is,

1. The method of uniting lens blanks which consists in assembling the blanks one upon the other, rendering the assembled blanks plastic by subjecting them to heat, and bending the blanks transversely by atmospheric pressure.

2. The method of uniting lens blanks which consists in assembling blanks of different refractive indices one above the other, rendering the assembled blanks plastic by subjecting them to heat, and transversely bending the plastic blanks by atmospheric pressure.

3. The method of uniting lens blanks which consists in assembling the blanks one upon the other, subjecting the blanks to heat to

fuse together their contacting surfaces, reducing the united blanks to a plastic condition by heat, and bending the blanks transversely by atmospheric pressure.

5 4. The method of uniting lens blanks which consists in assembling blanks of different refractive indices one upon the other, subjecting the blanks to heat to fuse together their contacting surfaces, reducing the united
10 blanks to a plastic condition by heat, and bending the blanks transversely by atmospheric pressure.

5 5. The method of uniting lens blanks which consists in assembling blanks one upon the
15 other, the upper blank being fusible at a lower temperature than the lower blank, subjecting the blanks to heat sufficient to fuse the face of the upper blank to the face of the
20 lower blank, reducing the united blanks to a plastic condition by heat, and bending the blanks transversely by atmospheric pressure.

6. The method of uniting lens blanks which consists in assembling blanks of different refractive indices one upon the other, the upper
25 blank being fusible at a lower degree of temperature than the lower blank, subjecting the blanks to heat to fuse the upper blank to the lower blank, reducing the united blanks to a plastic condition by heat, and
30 bending the blanks transversely by atmospheric pressure.

7. The method of uniting lens blanks which

consists in superimposing one blank upon the other, reducing the blanks to a plastic condition by heat, placing the plastic blanks upon
35 a die provided with a cavity beneath the blanks, and exhausting the air from the cavity to force the material of the blanks into the cavity.

8. The method of uniting lens blanks which
40 consists in assembling the blanks one upon the other, subjecting the assembled blanks to heat to fuse together their contacting surfaces, reducing the united blanks to a plastic condition by heat, placing the plastic blanks
45 upon a die provided with a cavity beneath the blanks, and exhausting the air from the cavity to force the material of the blanks into the cavity.

9. The method of uniting lens blanks which
50 consists in fixing in any convenient manner one lens blank upon another, placing the blanks upon a die provided with a cavity beneath the blanks, subjecting the blanks so positioned to heat to render the same plastic,
55 and exhausting the air from the cavity to force the material of the blanks into the cavity.

In testimony whereof I have affixed my signature in presence of two witnesses.

FREDERICK A. STEVENS.

Witnesses:

HORATIO E. BELLOWS,
JOSEPH E. BURNS.