(No Model.) 2 Sheets—Sheet 1.

G. W. BALLOU & A. SEAVER.

LAMP GLOBE.

No. 570,896. Patented Nov. 10, 1896.

Fig: 1.

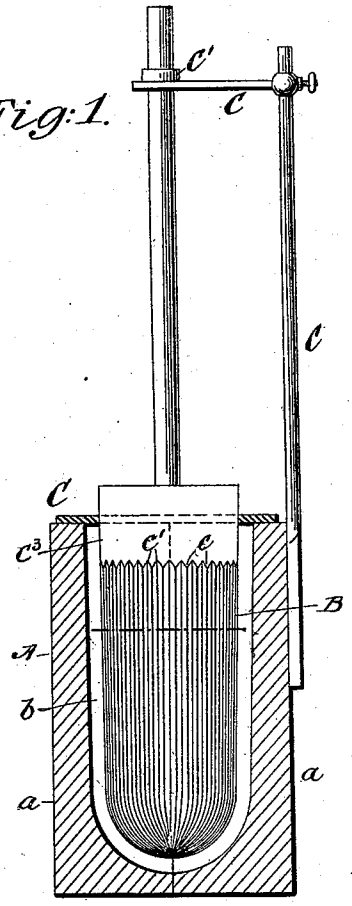


Fig: 2.

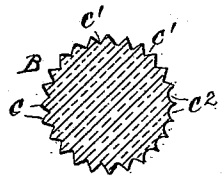


Fig: 3.

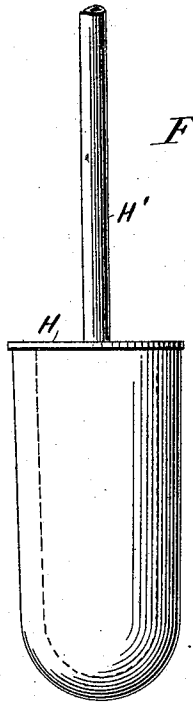
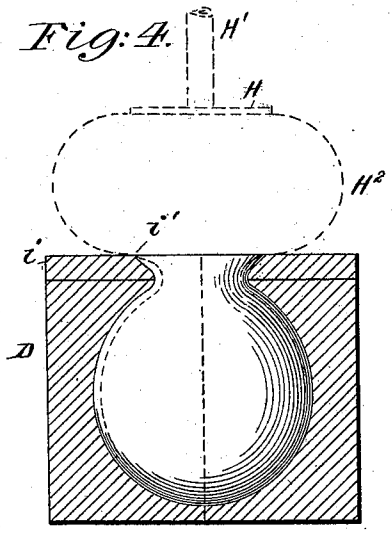


Fig: 4.



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(No Model.) 2 Sheets—Sheet 2.

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Fig: 5.

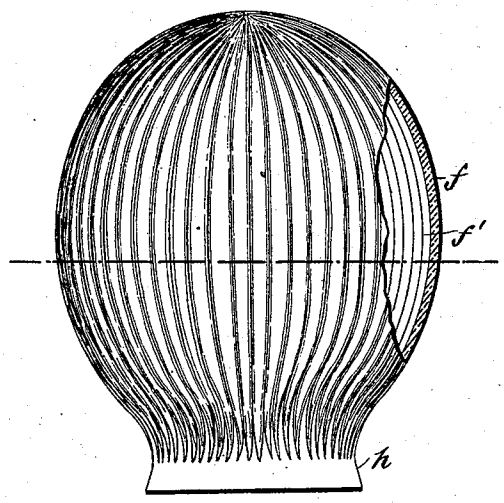


Fig: 6.

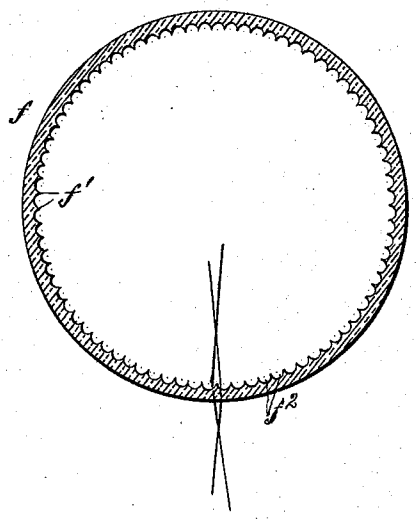
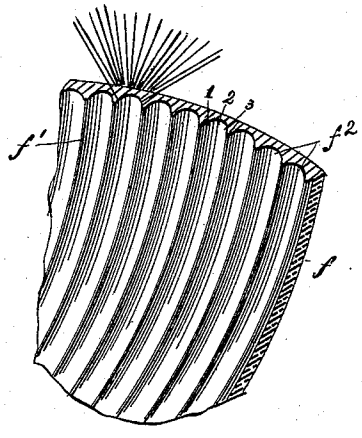


Fig: 7.



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UNITED STATES PATENT OFFICE.

GEORGE WILLIAM BALLOU, OF NEW YORK, N. Y., AND AUGUSTUS SEAVER, OF BOSTON, MASSACHUSETTS, ASSIGNORS TO THE UNITED STATES PRISM GLASS GLOBE COMPANY, OF NEW YORK.

LAMP-GLOBE.

SPECIFICATION forming part of Letters Patent No. 570,896, dated November 10, 1896.

Application filed June 24, 1896. Serial No. 596,690. (No model.)

To all whom it may concern:

Be it known that we, GEORGE WILLIAM BALLOU, a resident of New York, in the county of New York and State of New York, and AUGUSTUS SEAVER, a resident of Boston, in the county of Suffolk and State of Massachusetts, citizens of the United States, have invented certain new and useful Improvements in Lamp-Globes, of which the following is a specification.

Our invention relates to glass globes of prismatic type for enveloping electric, gas, and other lights used for illuminating streets, dwellings, &c.

The object of our invention is first to devise a process or method of making such globes, whereby we are enabled to produce each globe, of spherical or spheroidal form, in one entire piece of glass, with perfect interior prisms, the outer surface being smooth.

Another object is the production of such a globe wherein the interior prisms, longitudinal of the globe, are alternate thick and thin periscopic convex lenses, the horizontal section of the former being interior convex and that of the latter interior concave, the curved faces of the prisms pointing directly toward the center of the globe and of the source of light.

By our new process or method of manufacture we are enabled to produce the globes and prisms under conditions which preserve the fullest transparency of that portion of the glass which forms the exterior or main shell of the globe, and at the same time augment the smoothness and transparency of the side surfaces of the prisms, and also to make the prisms very close together, very distinct in outline, and with smooth and brilliant surfaces, and with the edges drawn sharp, so that the globe approximates cut glass in appearance. This said brilliant appearance of the globe results from the drawing of the glass (by blowing) along or away from the edges of the prisms, which said edges have been previously chilled in the first step of the process, and remain so throughout, so that sharp-edged prisms are insured, and so that in completing the globe by blowing all superficial mold marks are obliterated from the surfaces of the globe. The globe, therefore, presents the least possible resistance to the passage through it of the rays of light, and the prisms or lens-formations of the globe, by reflection and refraction, increase the apparent size of the flame or light within the globe and soften the light to the eyes of the observer and diffuse it without loss of illuminating-power, but with actual gain, and particularly with the electric and other very strong lights the globe acts to increase the effective general illuminating-power of the light, while at the same time it tempers the light to the eyes.

We will now describe our invention in detail, in connection with the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a sectional elevation of the mold and plunger employed in the first step of our process for forming the "bloom" or blank of glass from which the globe is formed. Fig. 2 is a sectional view of the plunger. Fig. 3 is a side elevation of the blank with the blowing-punty attached. Fig. 4 is a sectional elevation of the forming-mold, showing the globe, waste glass, and blowing-post in dotted lines. Fig. 5 is a sectional elevation of the globe. Fig. 6 is a sectional plan view of the globe, and Fig. 7 is an enlarged sectional perspective view of a portion of the body of the globe.

A represents a mold made in two parts *a a*, each formed with a semicylindrical cavity *b b* rounded and closed at the bottom, and B represents a substantially cylindrical plunger less in diameter than the cavity of the mold, tapered and rounded at its lower end and formed with longitudinal ribs *c c* around its circumference. These ribs are close together and the grooves or recesses *c' c'* are by preference brought to sharp points, but in some cases they may be rounded, as shown at the right of Fig. 2 at c^2, which formation will slightly round out the opposite inclined surfaces of each rib. C C C represent a guide for centering the plunger to the cavity of the mold, and said guide, in connection with stop C' on the handle of the plunger, serves to limit the inward thrust of the plunger into

the mold, so that a sufficient body of glass will remain undisturbed in the bottom of the mold after the plunger has been inserted.

In practice the two sections of the mold A will be closed and a proper quantity of molten glass will be poured therein, then the plunger B will be forced down into the mold and into the molten glass and left to remain until the whole body of glass has become sufficiently cooled or set to be removed for blowing, and then the plunger will be carefully withdrawn. In the interval of time the plunger remains in the glass, the prisms f', being partially isolated thin strips of glass, will have become chilled at their edges from contact with the plunger and colder than the remainder of the glass. On being removed from the mold the operator applies a cap and tube H H', usually termed a "punty," to the open end of the blank and lifts the latter from the mold, and by twirling forms the flange h in that portion of the blank which previously surrounded the plane portion c^3 of the plunger above the grooves and ribs. The blank is then placed in the shaping mold or form D and the blank is then blown to proper size, the same being reheated in the blowing process as often as required. The forming-mold is made in two sections adapted to be opened and closed, and at its open end is formed or provided with the annular beveled templet i, which perfects the flange h. In blowing, a surplus of glass forms a waste-bulb H^2, which is to be broken away at the angle i' from the permanent flange, which is subsequently cut or ground true. The reheating of the blank is external to the partially-formed globe, so that at all times the edges of the prisms remain in a chilled or comparatively cool condition, and in the process of blowing and enlargement of the blank to the proper size the glass spreads like a soap-bubble and becomes thin between the prisms and very smooth and transparent, and at the same time the prisms are stretched and the opposite inclined surfaces thereof are depleted of glass and the prisms become slender, very regular, and smooth, while the chilled edges of the prisms become sharp and regular and conform perfectly to the curved outline of the completed globe. All surfaces of the completed globe thus become highly polished, clear, and transparent to the extent of being nearly, if not quite, as brilliant as cut glass or as brilliant as the fracture of broken glass.

While we design to enlarge the spaces in the plunger, as shown at c^2, Fig. 2, and thus make the opposite sloping surfaces of the V-shaped prisms more concave than they would be if the surface were plane, we do not wish to be limited to this or any specific form of the grooves in the plunger, for the degree of refraction and reflection of the prisms and intermediate concave lenses may be in this manner varied according to the size of the globe to be made and according to the particular kind of light with which the globes may be designed to be used.

The globe constructed as described comprises the outer smooth spherical surface f, the curved interior prisms or lenses f', and the intermediate thinner lenses f^2 alternating the prismatic lenses f', which are each (in vertical section of the globe) periscopic convex lens, as shown in Fig. 5, while the opposite inclined side surfaces of the prisms are either plane or concaved and merge into the thin lenses f^2, so that each lens f^2 becomes substantially a plano-concave lens, as shown at 1 2 3, Fig. 7. The reflecting and refracting results are illustrated in Figs. 6 and 7, both within and outside of the globe. Looking through the globe at the light the lines of vision cross at a point about midway between the source of light and the edges of the prisms, so that naturally the flame or source of light is greatly magnified and also softened to the eyes and, reversely, the light is correspondingly diffused out into the room or space to be lighted. The rays of light which strike the apex of each prism are focused at a point away from the globe corresponding to the extent of surface exposed to the direct rays of light, and each sloping side surface of the prisms reflect the light to its neighboring inclined surface, and thence is refracted out into the room, while the lenses f^2 (1 2 3) between the prisms diverge the rays of light horizontally and also vertically, the latter owing to the general curved or spherical formation of the body of the globe.

The horizontal divergence of the rays produced by the intermediate lenses may be increased or diminished by cutting the grooves in the plunger to a more or less blunt angle, as indicated at c^2, Fig. 2.

We do not limit ourselves to any specific proportions, but for ordinary incandescent electric lamps we find by experiment that for a globe five inches in transverse diameter and five and one-half inches long the blank should be four inches in diameter and five inches long, and the glass three-sixteenths of an inch thick to the base of the prisms.

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

1. The method, or process, herein described of making glass prismatic globes, which consists in first forming chilled prisms upon the inner surface of a hollow blank of glass, and then drawing the glass between the prisms by blowing the blank to finished form; substantially as and for the purposes set forth.

2. The method, or process, herein described of making glass prismatic globes, which consists in first forming a blank of glass having a substantially smooth exterior surface and a central cylindrical cavity formed with a series of longitudinal prisms chilled at their edges from contact with a plunger, and then by successively blowing and externally re-

heating the blank drawing the glass between the prisms and enlarging and fashioning the same to finished form; substantially as set forth.

3. As a new article of manufacture a prismatic spherical globe, made in one piece of glass, and having a smooth exterior surface and having interior alternate prisms and concave lenses which prisms and lenses are also periscopic convex lenses from base to apex of the globe; substantially as described.

4. As a new article of manufacture a prismatic spherical globe, open at one end only, and made in one piece of glass, and having a smooth exterior surface and having interior alternate prisms and concave lenses which prisms and lenses are also periscopic convex lenses from base to apex of the globe; substantially as described.

GEORGE WILLIAM BALLOU.
AUGUSTUS SEAVER.

Witnesses to signature of George William Ballou:

WINTHROP POND,
H. A. WEST.

Witnesses to signature of Augustus Seaver:

JOHN T. REYNOLDS,
JOS. LEWIS.