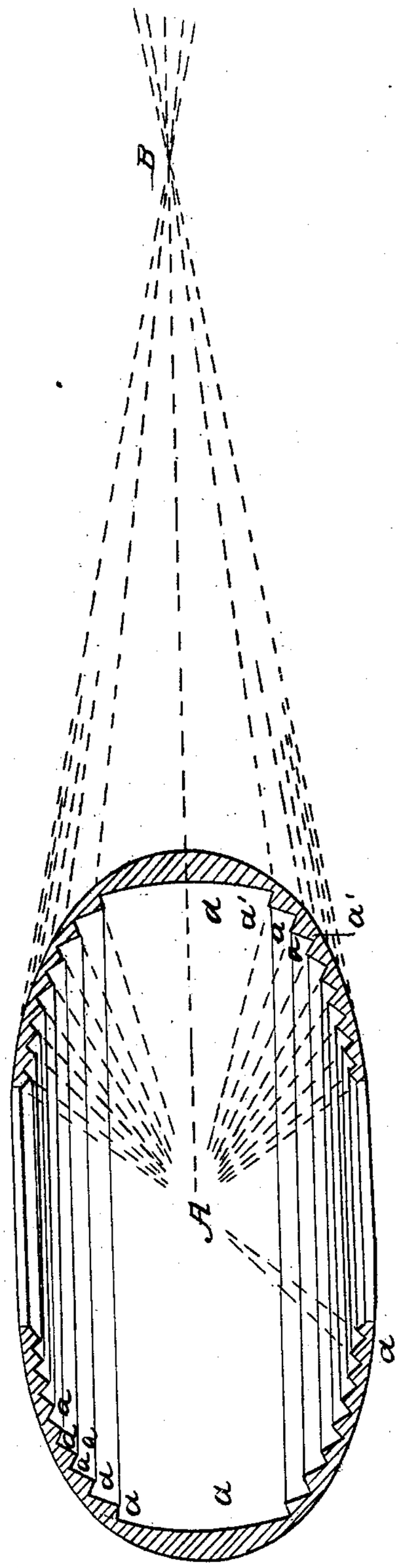
KEMBLE & BARTLETT.

Reflector.

No. 18,456. Patented Oct. 20, 1857.



UNITED STATES PATENT OFFICE.

WM. KEMBLE, OF NEW YORK CITY, AND WM. H. C. BARTLETT, OF WEST POINT, NEW YORK.

SHADE FOR LAMPS.

Specification of Letters Patent No. 18,456, dated October 20, 1857.

To all whom it may concern:

Be it known that we, WM. KEMBLE, of the city and State of New York, and WILLIAM H. C. BARTLETT, of West Point, county of Orange, and State of New York, have invented certain new and useful Improvements in Refracting-Shades for Lamps, &c.; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being made to the annexed drawing, making a part of this specification, that is to say:

Our invention is for an improvement in the construction of glass shades for lamps or other source of artificial light, and the object of our said improvement is to secure and concentrate in a horizontal direction all (or as nearly all as is possible) those rays projected above or below the radiant point. In lighting cities and particularly in light-houses the rays suffered to escape vertically or nearly so are lost, the slight amount returned by reflection being too little to be taken into account. In light houses this loss is avoided by the Fresnel system of detached rings or zones of prisms or by lenses. In our improved shade the light is deflected also by zones of prismatic section, but they differ in construction and arrangement, and they differ also by the governing principles by which they are arranged. In the Fresnel system some light is lost by reflection from the glass surfaces. This is a defect, and arises from the fact that the rays fall upon those surfaces at various angles, depending upon their position. But very few rays fall perpendicularly upon the interior surfaces, while in our improved shade all rays fall perpendicularly upon the receiving surfaces of the material which is to refract them or cause their deviation in the desired direction. Thus the rays of light suffer in passing the glass but one deviation, and that at the outer surface, which is a surface of accurate convergence and not spherical. As all rays fall upon the interior surfaces perpendicularly to those surfaces it follows that whatever reflection takes place does so in the direction of the radiant, and thus falls back upon the source of light. No loss can occur therefore from this cause. A further advantage consequent upon our improvement is the facility with which the instrument can be made and the comparatively slight cost of it. The figure being one of revolution, externally and internally, the glass may be ground and polished by turning, for the finest quality, or may be pressed in molds for the inferior ones. The external surface of our shade is perfectly smooth, and the shape is such that any section parallel to its equator would be a circle, while any section perpendicular to the equator would be ellipsoidal. The figure represented is such a section taken through the center. The interior is serrated by the formation of spherical zones alternating with conic frustums. The zones have their centers and the frustums their vertices at the center A, which is also the position for the light. From this it will be seen that each ray proceeding from the light must fall perpendicularly upon the zones (a) while none can fall upon the other surfaces (a') since these are parallel with the direction of the rays, hence it follows that each ray will pass through the glass without being refracted until it emerges when all are deviated into the desired direction. In the drawing these are shown as converging at B, but may be made to issue in parallel rays or diverging ones according to the uses to which the light is to be put. As the surfaces of the zones are polished, a portion of the light will necessarily be reflected, and here it will be seen that a prominent feature of our invention lies in the direction given to said reflected rays, viz. by projecting them back upon the source of light, whereby they are all saved and serve to increase the intensity of the illumination. The proper shape of the external surface of the shade will be found by a calculation based upon the index of refraction of the glass composing the same, and the intended direction of the rays. Thus the finding of the proper shape of the external surface is reduced to a calculation of two elements instead of three, as would be the case were the inner surface of a shape to refract the ray, and as is the case in the Fresnel system.

The shade may be made most conveniently of two parts, dividing it at the equator, and these may subsequently be cemented together. For certain purposes the lower half may be omitted, or left as plain glass, and this probably will be the best form for street lights. When the ground is to be illuminated the intercepted upward going rays instead of emerging parallel to the ground may be made to fall upon the ground at some proper distance, as for instance, at or near the next lamp post. For large constructions, as

for light houses, the envelop may be constructed in sections and built up in the usual maner upon a suitable supporting frame.

To a considerable extent the construction of the shade with a single interior spherical zone, that is, by producing in section the circle of the smallest of the zones and making thereby a single zone equal in width to the height of the shade, would produce the same results. The divergence of the rays would be precisely the same, but light would be lost by absorption in the larger amount of glass required, and hence the division of the interior surface by the conic frustums permits of presenting the greatest amount of receiving surface to the light and at the same time of reducing the thickness of the glass to the least which will give the necessary strength of construction. This, then, is the only purpose of the employment of those frustums, and it will be sufficiently obvious that were their vertices at any point other than that of the radiant A some loss would occur.

We claim—

The herein described method of constructing a refracting light-shade—that is to say—having its interior so shaped that all rays shall fall perpendicularly upon the receiving surfaces in combination with an exterior refracting surface by which only the rays shall be deviated into the required direction substantially as described herein.

WM. KEMBLE.
WM. H. C. BARTLETT.

Witnesses:
JOSEPH P. PIRSON,
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