No. 849,977.

PATENTED APR. 9, 1907.

W. CHURCHILL.

FRESNEL LENS.

APPLICATION FILED NOV. 22, 1906.

Fig. 2

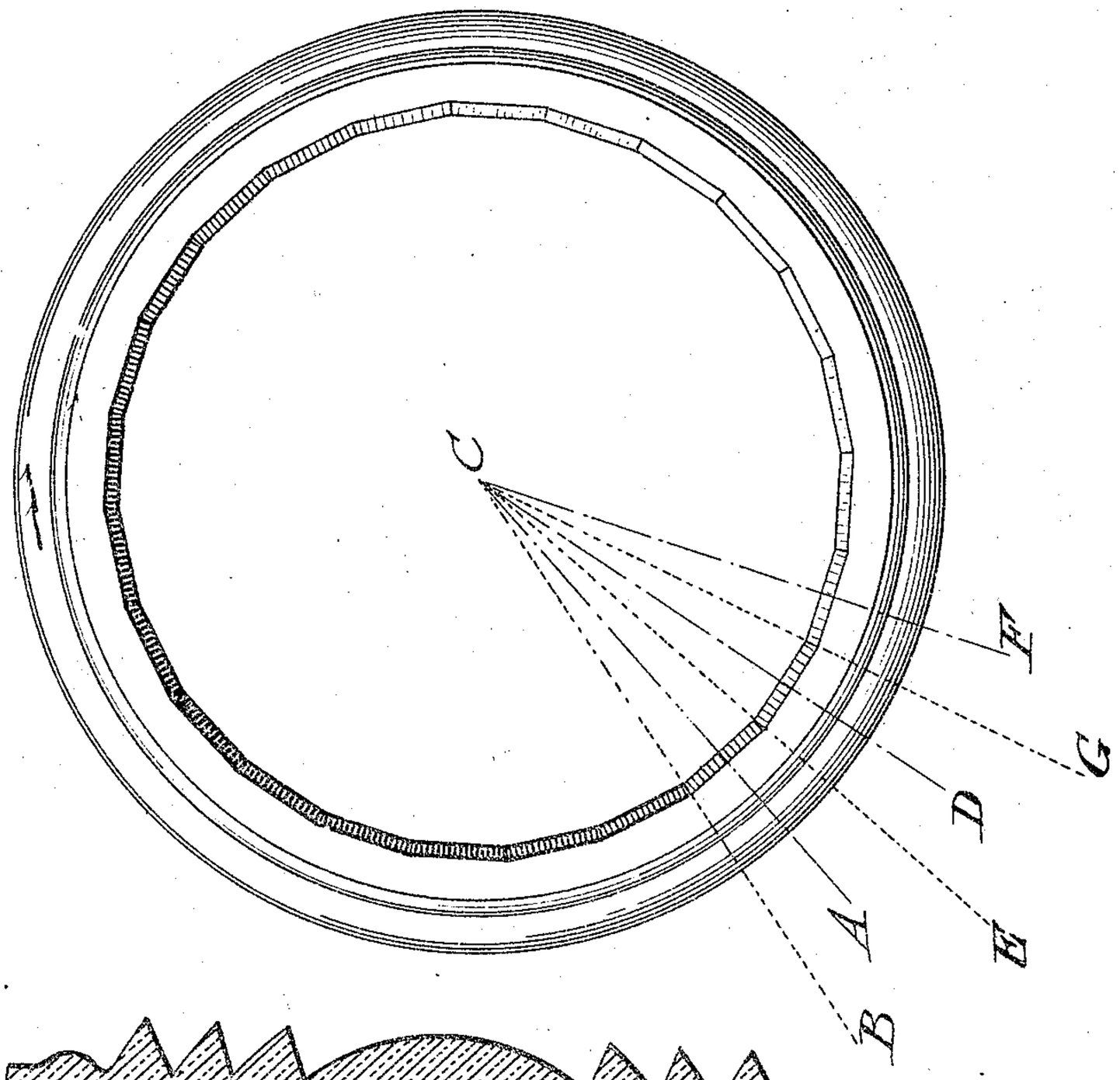
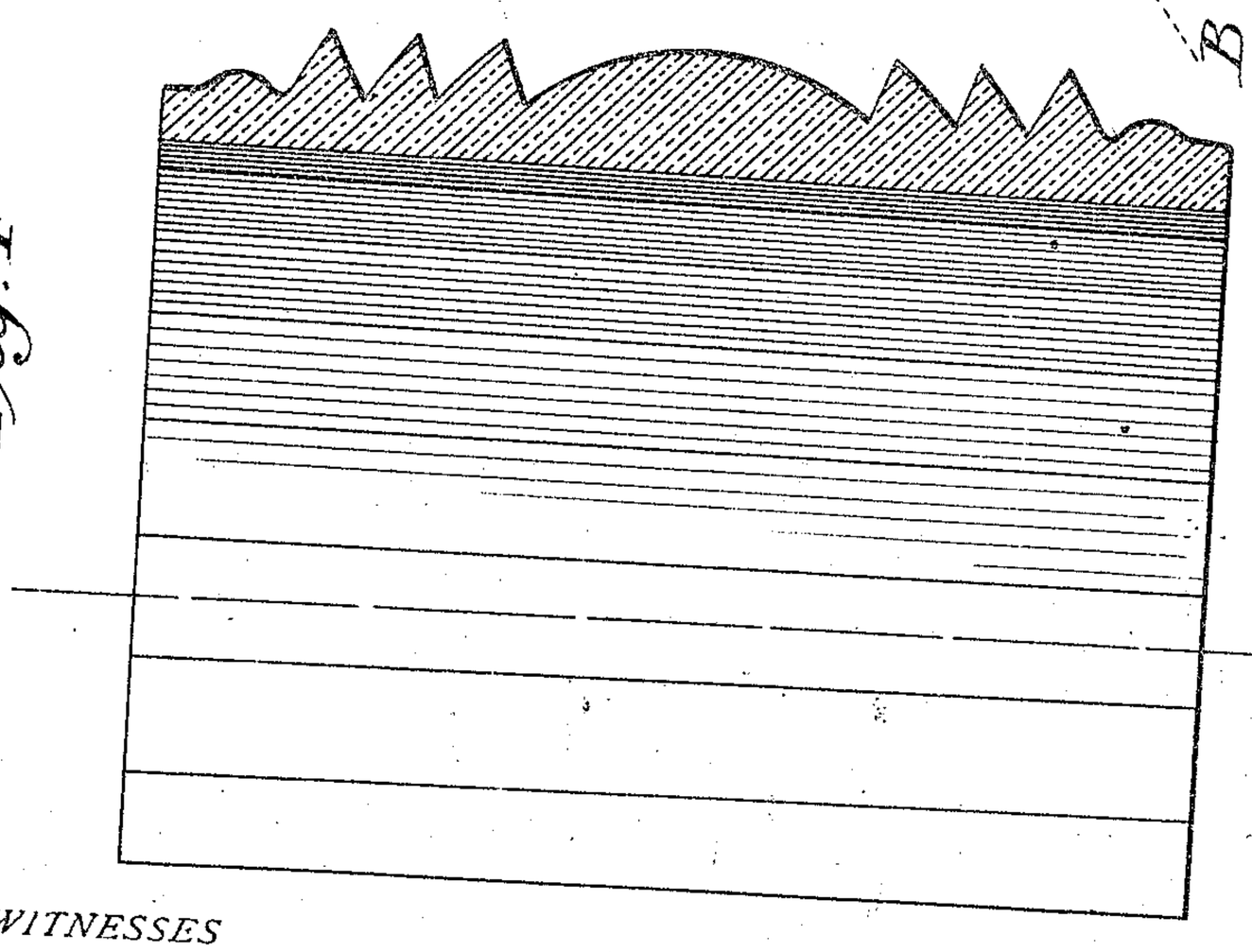


Fig. 1



WITNESSES

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FRESNEL LENS.

No. 849,977. Specification of Letters Patent. Patented April 9, 1907.

Application filed November 22, 1906. Serial No. 344,639.

To all whom it may concern:

Be it known that I, WILLIAM CHURCHILL, a citizen of the United States, residing at Corning, in the county of Steuben and State of New York, have invented new and useful Improvements in Fresnel Lenses, of which the following is a specification.

My invention relates to an improvement in the type of lens generally used in marine service for side lights, mast-head lights, and in various other ways, and also for signal-lights upon drawbridges over navigable rivers in conformity with the regulations of the United States lighthouse establishment. Such a lens consists of a hollow cylinder of glass or section of a cylinder, with corrugations arranged transversely on the outer face, the cylinder having a smooth inner face. Its effect is to produce a concentration of the light from the flame into a comparatively narrow fan-like beam spreading over the angle covered by the fresnel. In ship-lights such an angle is usually ten points of the compass, or one hundred and twelve and one-half degrees. The mast-head light usually covers two hundred and twenty-five degrees. Such fresnels are either constructed by building up a series of separate cut and polished segments of glass held in place by some kind of a metal frame or the lens is pressed in one solid piece in a metal mold.

My improvement in the construction of such lenses is seen in the accompanying drawings, in which—

Figure 1 shows in vertical section the profile of one side of a lens; but should a three-hundred-and-sixty-degree fresnel be represented the vertical section would show a corresponding profile on the opposite side of the figure. Fig. 2 is a horizontal section more specifically indicating the nature of my improvement, as hereinafter described.

My improvement consists in causing the inner surface of the lens to comprise a series of connected rectangular planes angularly disposed with respect to each other, each of the said planes being tangential to an inner circle which is concentric with the outer bounding circle of the lens, the inner surface of the lens, in other words, producing in cross-section a polygonal figure the axis of which is the center of curvature of the bounding circle. The optical result produced by such improved construction is that the light emanating from the flame is concentrated with a higher intensity along the axial planes bisecting the said rectangular surfaces at right angles. There is a corresponding diminution of intensity along similar axial planes proceeding through the lines of intersection of the rectangular surfaces. Such planes of concentration are illustrated in Fig. 2 by the lines C A, C D, C F, and the lines showing the planes of somewhat diminished intensity are those C B, C E, and C G. These lines are, as will be understood, cross-sectional of the planes mentioned above.

The main advantage gained by my improved lens is that owing to the higher intensity of the beams in certain planes the range of the light is increased, this result, which is of the highest importance in a signal-light being achieved by a simple and inexpensive change in this general type of lens, and the diminution of intensity in other planes above mentioned is not detrimental to the efficiency of the light, for the reason that since such lights are on board a vessel or other moving object in more or less continual motion, and since the observer is usually upon a moving vessel this motion in various directions will bring the regions of higher intensity within the range of an observer about as often as the regions of diminished intensity are brought within such range. When so desired, this flashlight effect can be enhanced by increasing the breadth of the plain surfaces forming the polygon and decreasing their number. For general purposes it will probably be advisable to use surfaces not much, if any, broader than the breadth of the flame used for illumination.

While I have preferably described my improved lens as one covering three hundred and sixty degrees, as shown more particularly in Fig. 2, it is to be understood that the invention is intended to include a lens covering any lesser number of degrees, as shown more especially in Fig. 1. While the lens in one of its forms is herein described as cylindrical and in its other form as a section of a circle, it is shown in each figure as having a slight taper, this being required in the act of molding.

Having thus described my invention, I claim—

1. An integral Fresnel lens the inner surface of which consists of a series of connected

rectangular planes angularly placed with respect to each other, each of the said planes being tangential to an inner circle which is concentric with the outer bounding circle of the lens, substantially as set forth.

2. An integral Fresnel lens the inner surface of which consists of a series of connected rectangular planes angularly placed with respect to each other and producing in cross-section a polygonal figure, the axis of such figure being the center of curvature of the outer bounding circle of the lens and each of the said planes being tangential to an inner circle which is concentric with said outer bounding circle, substantially as set forth.

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

WILLIAM CHURCHILL.

Witnesses:
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