

C. B. BOYLE, DEC'D.
E. J. & Z. M. BOYLE, ADMINISTRATORS.
OPTICAL INSTRUMENT.
APPLICATION FILED MAY 3, 1907.

931,673.

Patented Aug. 17, 1909.

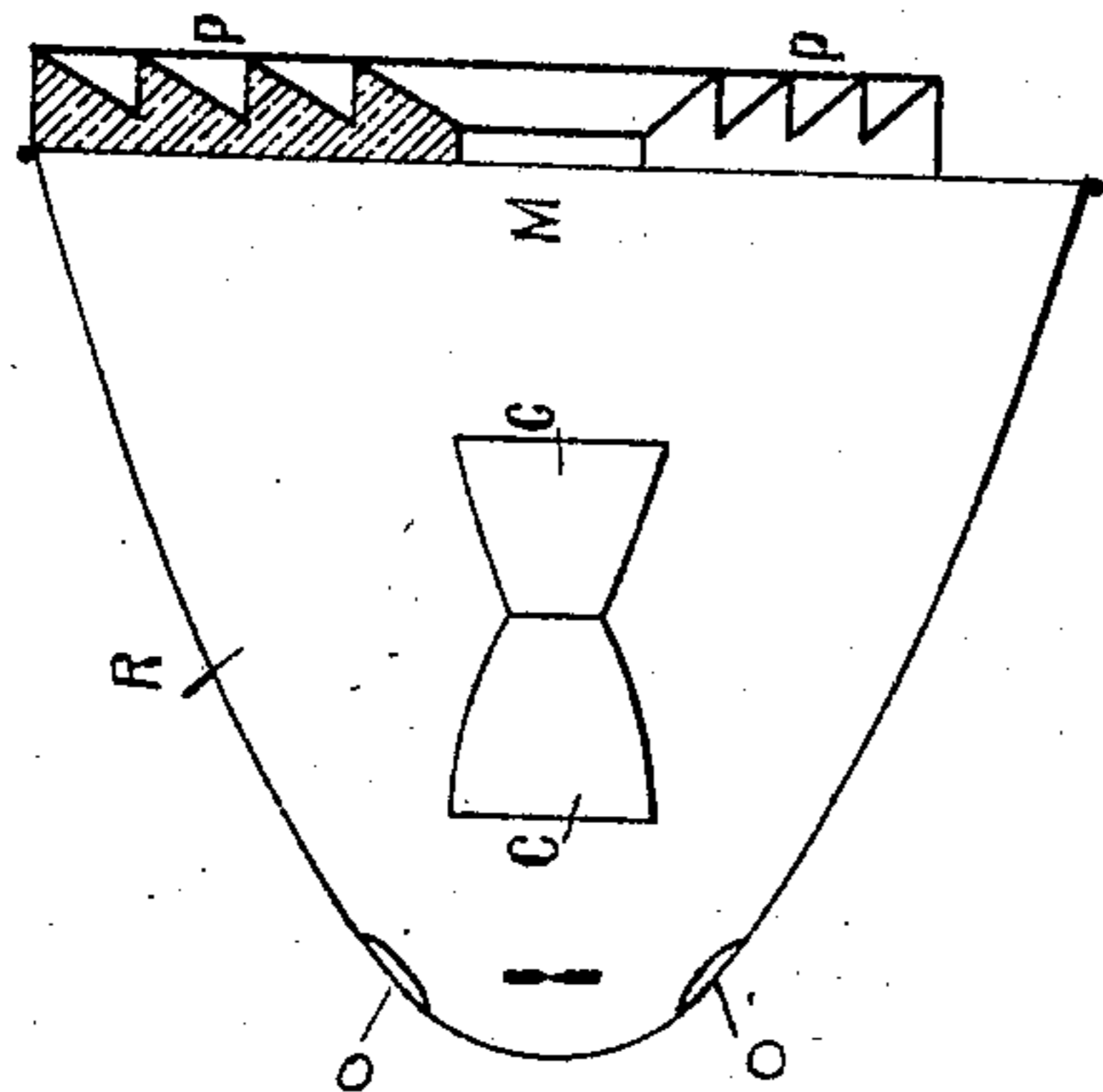


Fig. 2.

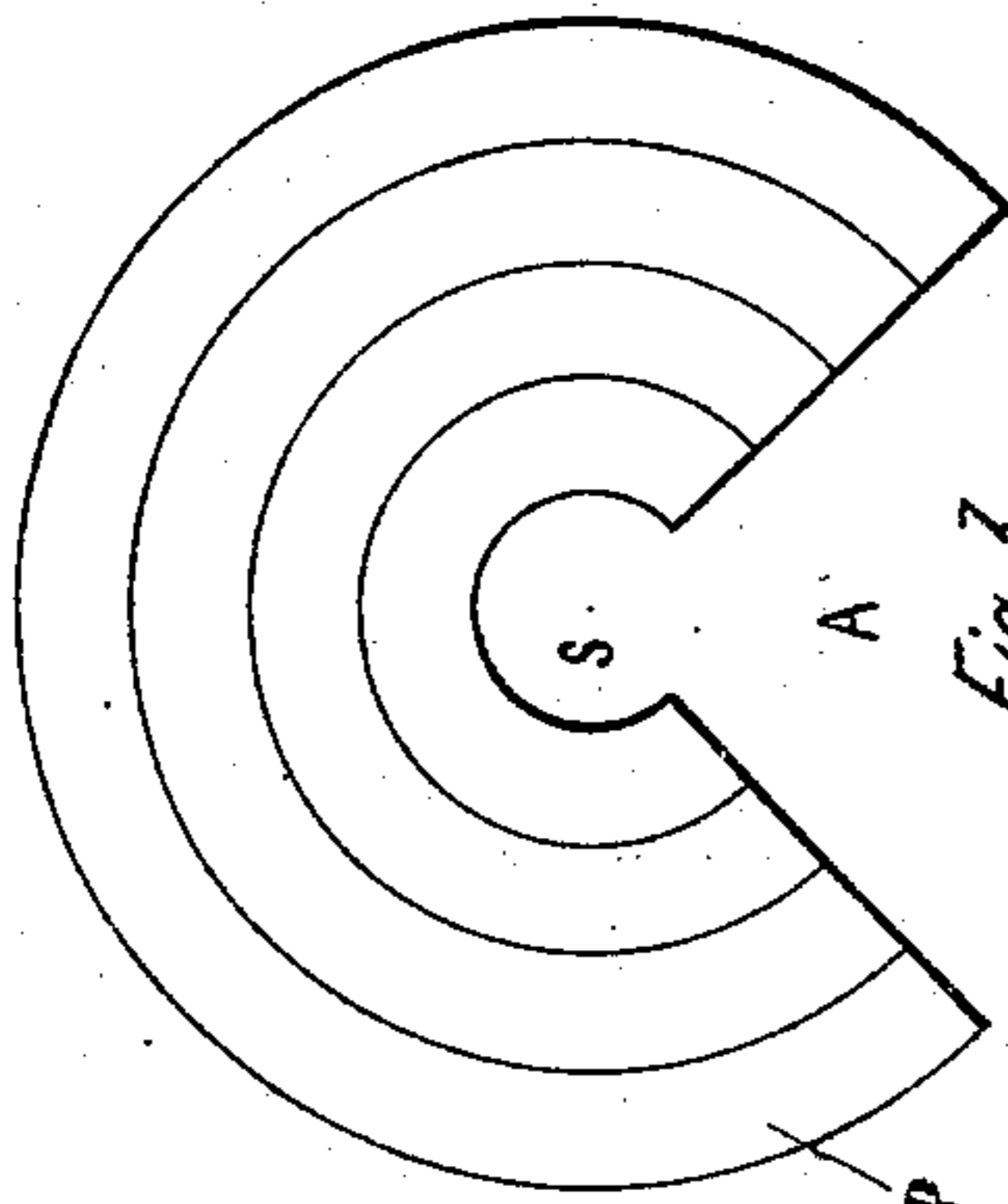


Fig. 3.



Fig. 4.

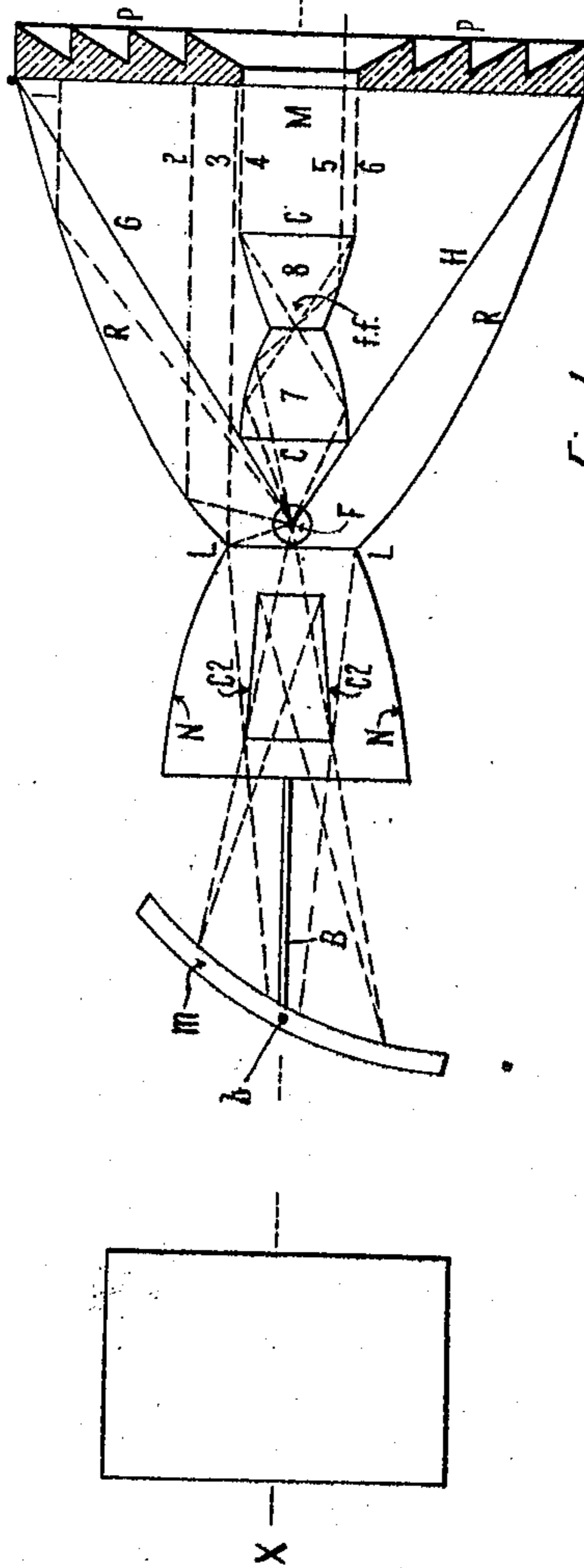


Fig. 1.

WITNESSES:

W. Worsheimer
J. Johnson

Charles Barry Boyle
INVENTOR
per E. J. & Z. M. Boyle and Zola.
his administrators
BY Herbert Wright
ATTORNEY

UNITED STATES PATENT OFFICE.

ELVA J. BOYLE AND ZOLA M. BOYLE, OF NEW YORK, N. Y., ADMINISTRATORS OF CHARLES BARRY BOYLE, DECEASED.

OPTICAL INSTRUMENT.

No. 931,673.

Specification of Letters Patent.

Patented Aug. 17, 1909.

Application filed May 3, 1907. Serial No. 371,740.

To all whom it may concern:

Be it known that CHARLES BARRY BOYLE, now deceased, of whom the undersigned, ELVA J. BOYLE and ZOLA M. BOYLE, who reside in the borough of Manhattan, city of New York, State of New York, are the duly appointed administratrices, invented certain new and useful Improvements in Optical Instruments, of which the following is a specification.

The said improvements are hereinafter described and are illustrated in the accompanying drawings which form a part of this specification and in which—

Figure 1 is a horizontal section of the entire instrument. Fig. 2 is a vertical section of the reflector and prismatic glass on the line X—Y Fig. 1. Figs. 3 and 4 are respectively a front view and a profile section of the annular prismatic glass which may be employed in the manner hereinafter described.

R, is a paraboloid reflector. M, is its mouth.

F is the point of an electric carbon or other source of light located approximately at the focus of the said paraboloid reflector, the light from which, striking the walls of said reflector at angles of radiation which are indicated by the dotted lines 1, 2, 3, and also by the solid lines G. H. is turned forward and passes through the mouth of the reflector in a direct beam.

C. C. is a double parabolic cone so arranged concentrically within the large paraboloid reflector, R as to intercept all rays which would pass directly beyond the edges of the reflector. As stated this double parabolic cone C. C. is arranged within the reflector R and lies entirely between the source of light F and the mouth M of the reflector. That is to say, the rays between the lines G. H. describing an arc smaller than the opening of the mouth of the reflector R would if not intercepted, pass beyond it as scattering light. Therefore the divergent rays between the lines G. H. are caught on the inner surface of the anterior section 7 of the double parabolic cone C. C.; thence they are deflected and passing through at the focus *f. f.* to the surface of the outer section 8, of the double parabolic cone C. C. are sent forward in a direct beam indicated by the lines 4, 5, 6. This double parabolic cone C. C. takes the place of a concentrating lens. The two parts or members are fitted

back to back, the smaller ends being removed or cut away on lines corresponding with their respective foci. So formed, they are posed concentrically within the paraboloid reflector R and at such a point in its optical axis as will place the flame or source of light in perfect optical relation to the combined foci of the two reflectors C. C.

The double parabolic cone C. C. is placed concentrically within the paraboloid reflector R and at the point and position where it intercepts all the rays of light between the lines G. H., which rays would otherwise escape as scattering light. The rays from the source of light between said lines G. H. being received on the surface of the inner section of the double cone are re-focused at the superimposed foci *f. f.* From thence the rays are radiated to the surface of the outer section and the entire light being thus parallelized is sent forward in an intense central beam.

The combination of the paraboloid reflector with a source of light located approximately at its focus and the two smaller cones cut through their respective foci and attached back to back and located entirely within the reflector R and between the source of light and the mouth of the reflector, constitutes an arrangement available as a lamp for automobiles and other vehicles, or for lanterns.

P is a glass which is placed at the mouth of the reflector R and which is cut away between the points touched by the rays 4, 6. This glass consists of a succession of annular prisms as shown in Figs. 3 and 4.

N. Fig. 1, is a smaller curved reflector fastened to the back of the paraboloid reflector at L, L, the reflector R being cut away on the line L, L, to allow of the attachment of the smaller reflector N. The reflector N contains a cone C² C² whose sides are at a slightly divergent angle and whose action in gathering the radiant light of its own reflector is exactly the same as described in the larger reflector R.

The light from the reflector N is caught upon the surface of a curved mirror *m*, which is placed in a focus of its beam, and which is fastened to the reflector by a bar B and pivot *b* as shown. This light is flashed at will by the turning of the mirror.

Fig. 2 is a vertical cross section of the reflector R through the line X, Y, of Fig. 1

showing section of glass cut away, and openings O, for carbon points.

Figs. 3 and 4 are respectively a front view and profile section of the annular prismatic glass; Fig. 4 showing four successive annular prisms. The circle S, is cut away as is also the angle A. The glass has nothing whatever in common with a semaphore, as the surface of a semaphore is curved, its steps are rectangular having none of the optical lines of a prism, and the light which passes through a semaphore remains white. This glass is distinctly a succession of annular prisms each constructed on the optical lines of a prism, and the light which passes through it is resolved into the seven colors of the spectrum and casts the rainbow arc.

Having thus described the invention, the following is what is claimed as new therein and what is desired to be secured by Letters Patent.

1. The combination of a source of light, a paraboloid reflector, two smaller paraboloid reflectors which are cut away exactly at their foci and placed back to back and which are located within the larger reflector and in such a position as to intercept divergent rays and direct them outwardly in parallel beams.

2. The combination of a source of light, a paraboloid reflector, two smaller paraboloid reflectors which are cut away exactly at their foci and placed back to back and which are located within the larger reflector and in such a position as to intercept divergent rays and direct them outwardly in parallel beams, and means for resolving said light into the prismatic spectrum whereby a rainbow arc is produced.

3. In an instrument of the character described, the combination of a parabolic reflector cut away at the back, a source of light

located at the focus of the said reflector, a smaller reflector located at the back of the main reflector, a mirror located in a focus of the beam of said smaller reflector, and means at the mouth of the larger reflector for resolving the light into the prismatic spectrum whereby a rainbow arc is produced.

4. In an instrument of the character described, the combination of a parabolic reflector cut away at the back, a lamp located at its focus, of a smaller reflector located at the rear of the main reflector, a cone whose sides are divergent angles arranged within the smaller reflector, a mirror located in a focus of the beam of said smaller reflector and means located at the mouth of the larger reflector for resolving the light into the prismatic spectrum whereby a rainbow arc is produced.

5. In an instrument of the character described, the combination of a reflector cut away at the back, a source of light located at the focus of the reflector to the rear of the back opening, a cone located in the reflector between its mouth, or larger opening, and the source of light, for receiving and focusing on a mirror all light which would otherwise diverge through the mouth of the reflector, with said mirror located within the focus of the beam of the said reflector and exterior to its mouth or larger opening.

This specification signed and witnessed this 10th day of April, A. D., 1907.

ELVA J. BOYLE,
ZOLA M. BOYLE,

Administrators of Charles Barry Boyle, deceased.

Signed in the presence of—

HERBERT KNIGHT,
M. DORSHEIMER.