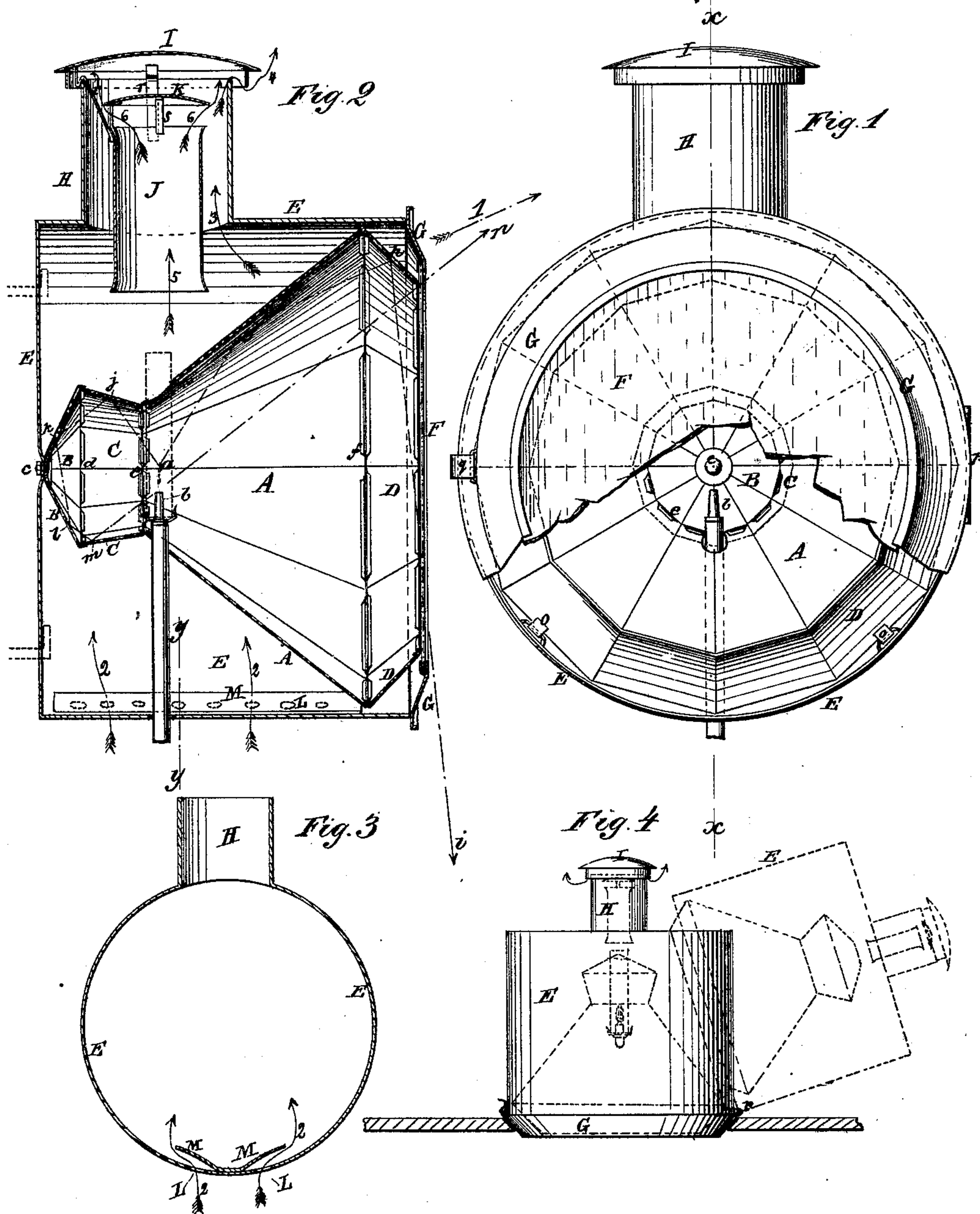


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Reflector.

No. 213,744.

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## IMPROVEMENT IN REFLECTORS.

Specification forming part of Letters Patent No. 213,744, dated April 1, 1879; application filed February 6, 1879.

*To all whom it may concern:*

Be it known that I, WILLIAM J. FLICK, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Reflectors, of which the following is a specification:

The object of my invention is to provide an improved reflector, applicable in any position, horizontal or vertical, for use in illuminating rooms, halls, and public places, for head-lights on locomotives, and for other purposes, and so constructed that a large portion of the rays reflected shall be refracted laterally to throw a cone of light so obtuse that its surface will almost coincide with the face-plane of the reflector, thereby illuminating a much larger space than can be done by reflectors as heretofore constructed, which throw an acute cone of light only forward, leaving the side spaces dark; and, further, so constructed as to prevent extinction or flickering of the light by sudden gusts of wind, and to prevent rarefaction, by too much heat, of the air inside of the reflector, and the consequent disturbance of reflection.

The invention consists in the construction and combination of the various parts, as will be hereinafter described.

In the accompanying drawings, Figure 1 represents a front view of my improved reflector, a portion of the glass face-cover being broken away. Fig. 2 is a longitudinal vertical section of the same, taken through the line  $xx$  of Fig. 1. Fig. 3 is a cross-section of the casing, taken on the line  $yy$  of Fig. 2. Fig. 4 represents the reflector as when applied in the ceiling, or with its face horizontal.

Similar letters of reference indicate corresponding parts.

The reflector is composed of conical or pyramidal frusta, lined preferably with corrugated silvered glass, and arranged so that their axes coincide with one and the same line in which is located the flame from the burner  $b$ , at  $a$ , in, or nearly in, a focus common to all the reflector-surfaces.  $A$  is the main reflecting-surface, surrounding the flame  $a$ .  $B$  is an inner smaller reflecting-surface in rear of the flame, and secured at the apex, at  $c$ , to the casing  $E$ , which surrounds the reflector. The cones  $A$  and  $B$  are arranged to present their

bases toward the front or face  $F$  of the reflector, and are joined together by an inverted or inward-flaring frustum,  $C$ , whose base-plane coincides, at  $d$ , with the base-plane of the rear cone,  $B$ , and whose smaller end plane coincides, at  $e$ , with that of the cone  $A$ .  $D$  is a short frustum, inverted similar to  $C$ , and arranged just inside the face  $F$ , its base-plane joining at  $f$ , and coinciding with that of the main cone  $A$ .

The advantage of this construction will be seen by tracing any ray of light—for instance,  $ag$ . In an ordinary reflector the ray  $ag$  would be reflected from the point  $g$  continuous in the direction of the arrow 1; but in this case it is refracted at  $h$  by the surface of the inverted frustum  $D$ , and thrown out, as indicated by the line  $hi$ , in a plane almost coinciding with the face-plane  $F$  of the reflector, thus illuminating a vastly larger space than would be within the cone of light limited by the line  $g$  and the arrow 1. In a similar manner the rays reflected by the cone  $B$  onto the inverted frustum  $C$  are refracted to one or the other of the frusta  $A$   $D$ , and finally thrown upon the space to be illuminated.

It will be seen that rays altogether lost in other reflectors are here utilized. Thus the ray  $aj$ , striking the frustum  $C$  at  $j$ , is reflected four times—viz., at  $j$   $k$   $l$   $m$ —and issues from the reflector in the direction of  $mn$ . The glass plate  $F$ , covering the face of the reflector, is secured in a tight-fitting ring or rim,  $G$ , hinged at  $p$  to one side of the casing  $E$ , and securable to the opposite side by a catch,  $q$ . The periphery of the reflector-base  $f$  is secured to the inside of the casing  $E$ , in three or more places, by catches and staples  $o$ .

A current of air enters the casing, as indicated by the arrows 2, through the rows of holes  $L$ , covered by deflecting-plates  $M$ , and keeps constantly circulating around the reflectors, thus cooling them and preventing rarefaction, by heat, of the air inside, which otherwise would disturb reflection.

The air necessary for supporting combustion enters through the crevices around the burner, and at the junctions  $d$   $e$   $f$  of the several cones. The air entering at  $L$  passes out of the casing  $E$ , through the top flue,  $H$ , under the rim of the cap  $I$ , in the direction of the arrows 3 4. The



cap I is supported upon the upper edge of the flue H, leaving a space between them, by three or more strips of metal, *r*, converging downward, and to which is secured or suspended, within the flue H, the smaller central tube, J, through which the gases of combustion rise from the burner *b*, and pass off in the direction of the arrows 5, 6, and 4. The tube J is flaring at its ends, and covered on top by a cap, K, elevated above the tube upon braces or strips *s*. The vertical rim of the cap I is larger in diameter than the flue H, and its edge projects below the upper edge of the latter, so that free escape is allowed to the air from the interior of the casing, while a horizontal gust of air is prevented from entering the chimney and interfering with the light, as whatever air might enter under the front edge of the rim would pass off at the rear edge after only passing between the caps I and K; and if a small portion would go downward it must then pass between the tube J and the flue H, and thus not enter the reflector.

When the face of the reflector is desired to be used in a vertical position, as in Fig. 2, the rear end of the casing E is perforated suitably to be hung upon hooks in the wall, as shown in dotted lines; but when it is desired to place the reflector with its face horizontal, to throw the light downward, the rim G of the face-glass F is fastened in an opening in the ceiling, and the burner *a*, the chimney, and the flue H are arranged in the extended axial line of the cone-reflectors, as illustrated in Fig. 4. In this case the burner-pipe outside of the casing is connected to a flexible pipe, which will

allow of throwing back the casing and reflectors from the front cover, G F, turning it upon the hinge *p*, as indicated in dotted lines in Fig. 4, thus gaining free access to the burner *a* and to the interior of the frusta.

I do not confine myself to the conical or pyramidal shape of the reflectors or "refractors," as a paraboloid or ellipsoid, or other shape, may answer the purpose, nor to the use of any particular kind of material for the reflecting-surfaces.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination of the forward reflecting cone or frustum, A, with the inverted or refracting frustum D, joined together in the plane of their bases, substantially as and for the purpose set forth.

2. The combination of the inner and outer forward reflecting cone and frustums, B A, with the inverted or refracting frusta C D, arranged and joined together substantially as shown and described, and for the purpose set forth.

3. The tight-fitting front cover, G F, hinged to the casing E in position, when closed, to present the glass F in contact with the face or edge of the outer frustum, D, to allow of free emission of the lateral rays *h i*, substantially as shown.

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