(No Model.)

J. JACOBS.

ILLUMINATING TILE.

No. 458,850. Patented Sept. 1, 1891.

Fig. 1

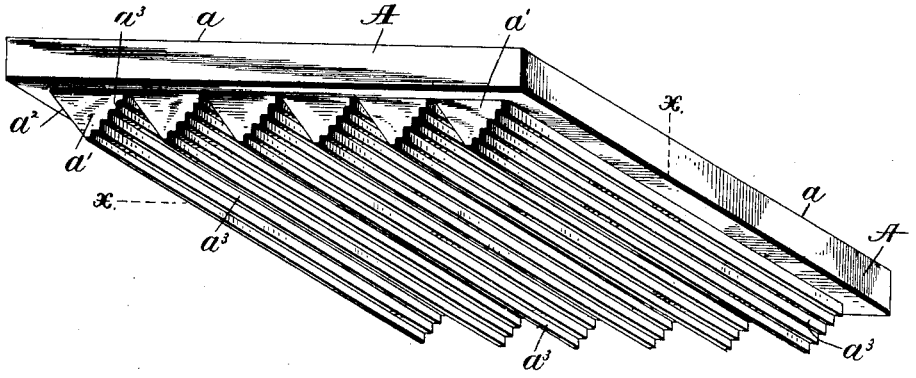


Fig. 2.

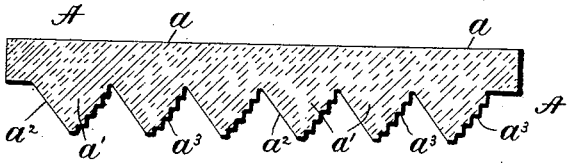
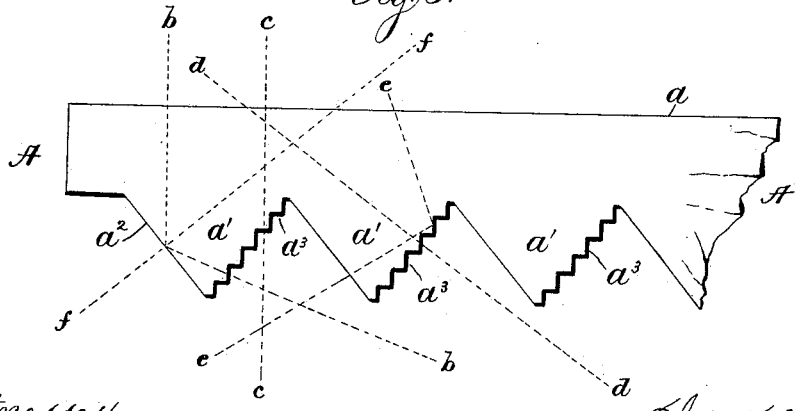


Fig. 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

JACOB JACOBS, OF NEW YORK, N. Y.

ILLUMINATING-TILE.

SPECIFICATION forming part of Letters Patent No. 458,850, dated September 1, 1891.

Application filed April 17, 1891. Serial No. 389,273. (No model.)

To all whom it may concern:

Be it known that I, JACOB JACOBS, of New York, in the county of New York, and in the State of New York, have invented certain new and useful Improvements in Illuminating-Tiles; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of a lens constructed in accordance with my invention. Fig. 2 is a sectional view on the line $x\,x$ of Fig. 1; and Fig. 3, a detail view in elevation of a portion of a lens, shown on a larger scale than the preceding figure.

Letters of like name and kind refer to like parts throughout the several figures.

The object of my invention is to provide a lens for use in illuminating-tiles or other situations where it is desirable and important that there shall be as complete collection and utilization of rays of light as is possible; and to this end said invention consists in a lens having the construction substantially as hereinafter specified.

In constructing my lens I have had in view the utilization of those rays of light which with lenses of ordinary construction are lost, owing to the law of optics that when the line of their direction has a certain angle to the plane of the surface which receives them they will not be transmitted through such surface, but will be reflected therefrom, and this I have sought to do without impairing the transmission of such rays as are ordinarily passed through the lens unaffected as are those above referred to.

My lens, as shown, consists of a plate of glass A, rectangular in outline, with a plane surface a, which is to be placed toward the source of light when in use, and a surface opposite thereto formed by a number or series of triangular projections a', which extend in parallel lines across the plate, whose bases are the sides of the plate and whose apices stand away therefrom, and preferably having their inclined sides or faces at the same angle of inclination. One face a^2 of each of these triangular projections is a plane surface, but the other is formed into a number of projections a^3, which may be in the form of small triangular protuberances or ribs extending parallel with each other and with the projection itself, on whose side they are formed. One side of each of the small projections is preferably parallel with the plane surface a of the plate A, while the other is at a right angle thereto.

A lens as above constructed will operate to transmit and diffuse light for illuminating purposes to excellent advantage. Such rays as fall perpendicularly to the surface a will where it is at the point opposite the plane side or face a' of one of the triangular projections pass through the plate of glass until they strike said plane surface (being of course refracted in transit) and from the same be reflected at an angle not much inclined from a horizontal plane if the lens be placed horizontal. The course of such rays is indicated by the dotted line b, Fig. 3. Similar rays which fall upon the surface of the plate opposite the small triangular projections or ribs a^3 will pass directly therethrough in a line coincident with that of their entrance without refraction or reflection, as shown by the dotted line c, Fig. 3. The effect of these ribs a^3 upon such rays as come in directions most oblique to the plane surface a of the plate A (which rays are ordinarily lost because of the law above stated) is to allow the direct transmission of some, such as those indicated by the dotted line d, which favorably strike the face of the ribs a^3, which is at a right angle to the surface a and the reflected transmission of others, such as those indicated by the dotted line e, which come within the operation of the said law. Some rays, of course, will strike the the faces of the ribs a^3 so as to be reflected against the plane face a^2 of the adjacent projection, but these in large measure will in turn be reflected by said face into the space where they are needed, and so will be utilized. Rays proceeding in a direction at right angles to the plane surface a^2 (indicated by the dotted line f) will pass directly through the glass without reflection, although, of course, with some refraction. It will thus be seen that provision is made for the direct transmission of rays perpendicular to the surface a of the plate A, as the rays c, for the direct transmission of the obliquely-falling rays, as the rays d and f, and for the reflected transmission of rays of both description. It will be seen, too, that the direction given the light by the lens

in directly transmitting and in reflecting it, diffuses or distributes it over a wide area.

I am aware that it has been proposed to form plates of glass with triangular or prism-like projections on one face but such projections were to have both their faces plane. Such an arrangement differs essentially from mine, in that with both faces plane surfaces there can be a direct transmission of the oblique rays only, the perpendicular rays being reflected.

If desired, the surface *a* of the plate A may be other than plane and the shape of said plate other than rectangular. So, too, the projections need not be straight ribs and their angular shape may be varied.

Having thus described my invention, what I claim is—

1. As an improvement in illuminating-tiles, a lens consisting of a glass body having on one of its faces a rib that stands away from such body and on which are small projections or protuberances, substantially as and for the purpose specified.

2. As an improvement in illuminating-tiles, a lens consisting of a glass body having a series of triangular projections, on each of which are formed a number of small angular projections or protuberances, substantially as and for the purpose shown.

3. As an improvement in illuminating-tiles, a lens consisting of a glass body having a series of parallel projections or ribs, each triangular in cross-section and having a series of parallel triangular ribs on one face, the other face being a plane, the ribbed face of one triangular projection being opposed to the plane face of the adjacent projection of the series, substantially as and for the purpose specified.

4. As an improvement in illuminating-tiles, a lens having a plane face and a face formed by a series of parallel projections on which is a series of smaller projections or protuberances, substantially as and for the purpose set forth.

5. As an improvement in illuminating-tiles, a lens consisting of a plate of glass having a plane surface and a surface formed by a series of triangular projections or ribs on which is a series of smaller triangular ribs, each of the latter having a face parallel with the plane surface of the glass and a face at a right angle thereto, substantially as and for the purpose shown.

In testimony that I claim the foregoing I have hereunto set my hand this 13th day of April, 1891.

JACOB JACOBS.

Witnesses:
GEO. W. TICE,
D. G. BEECHING.