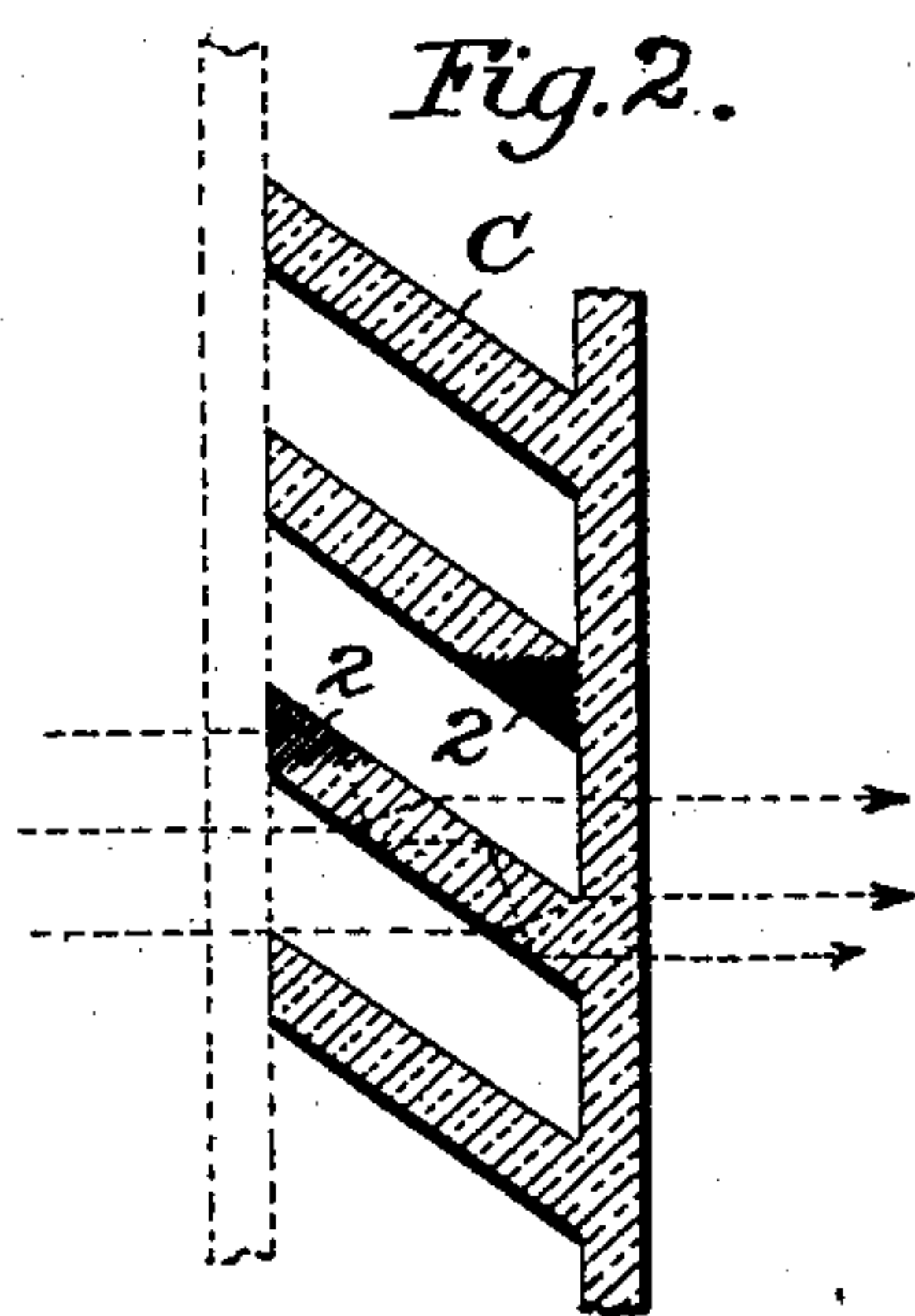
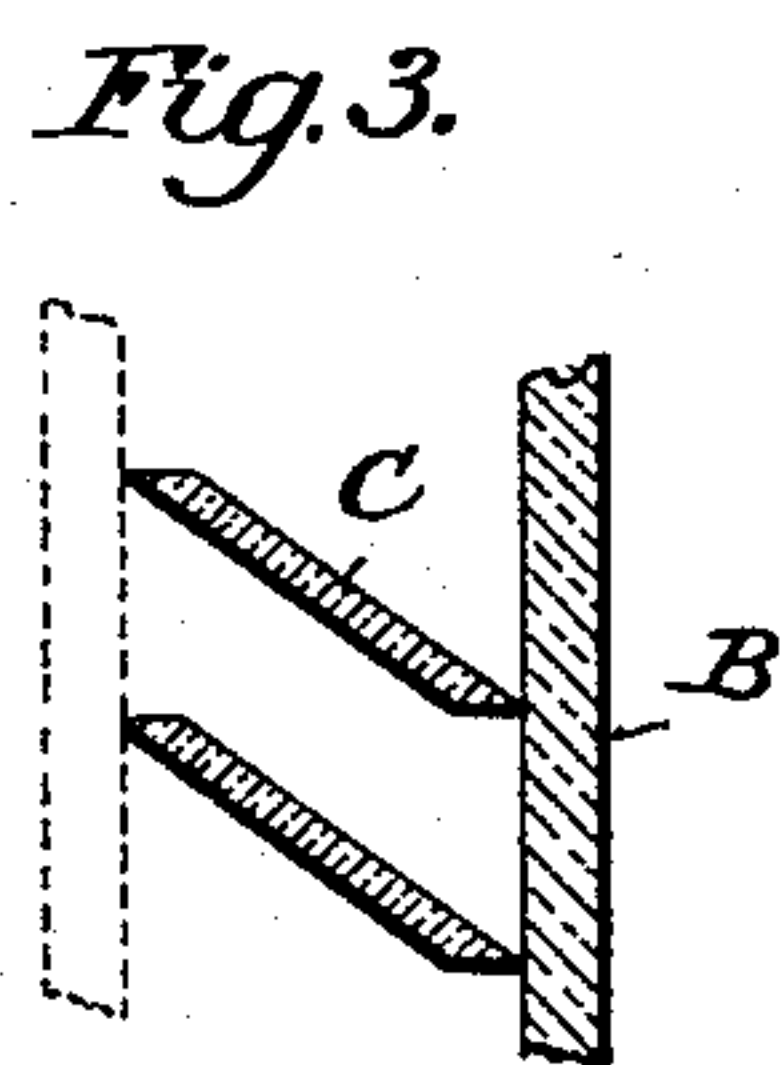
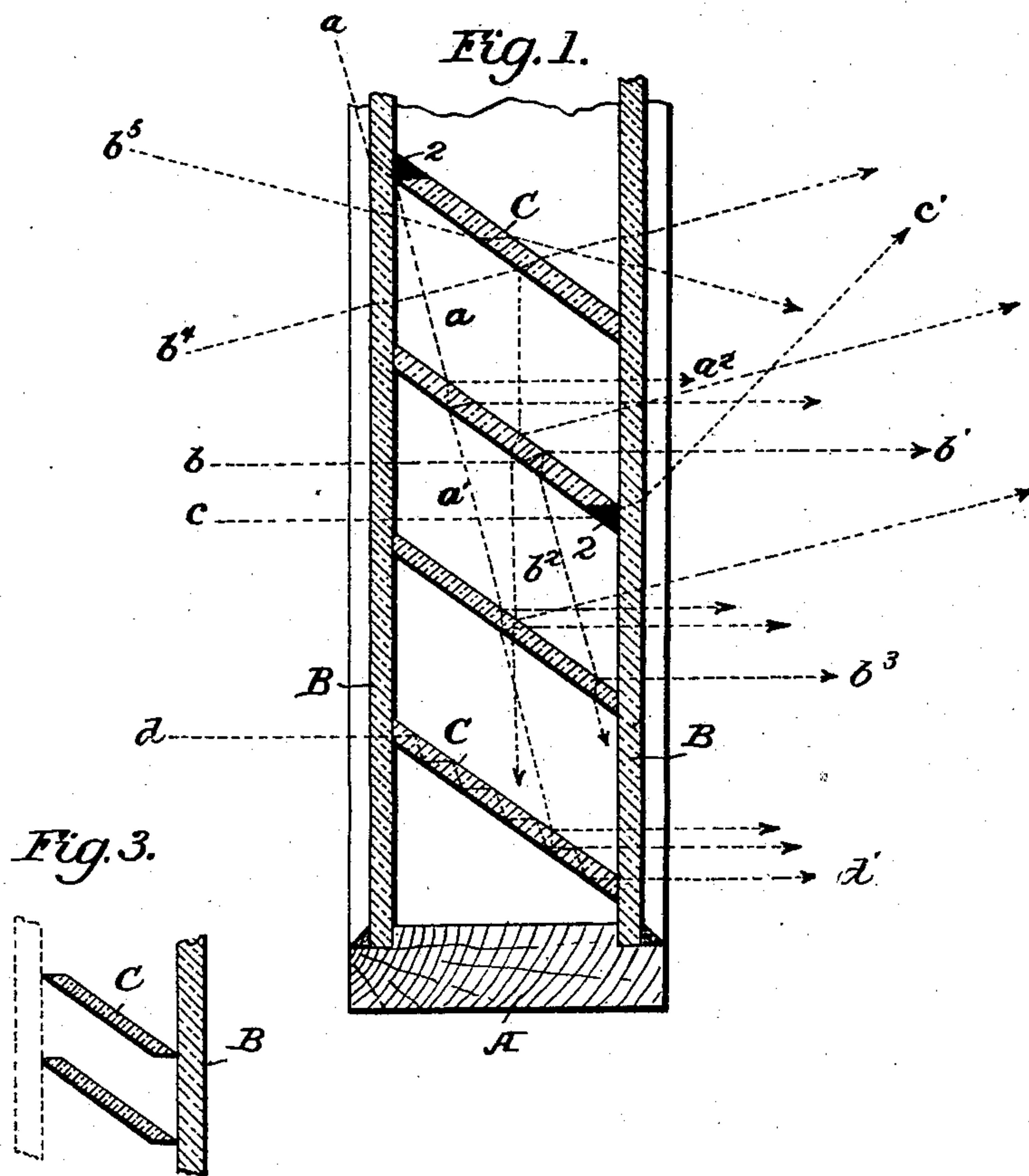


F. L. O. WADSWORTH.
ILLUMINATING STRUCTURE.

APPLICATION FILED MAR. 31, 1898.

NO MODEL.



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UNITED STATES PATENT OFFICE.

FRANK L. O. WADSWORTH, OF WILLIAMS BAY, WISCONSIN, ASSIGNOR, BY
MESNE ASSIGNMENTS, TO PRESSED PRISM PLATE GLASS COMPANY, A
CORPORATION OF WEST VIRGINIA.

ILLUMINATING STRUCTURE.

SPECIFICATION forming part of Letters Patent No. 719,065, dated January 27, 1903.

Application filed March 31, 1898. Serial No. 675,973. (No model.)

To all whom it may concern:

Be it known that I, FRANK L. O. WADSWORTH, a citizen of the United States, residing at Williams Bay, in the county of Walworth and State of Wisconsin, have invented certain new and useful Improvements in Illuminating Structures, of which the following is a specification.

Many of the structures devised for illuminating rooms and spaces not accessible to direct light from the illuminating source are effective in directing a portion of the light by reflection or refraction into such rooms or spaces; but owing to other characteristics or features of construction the approximately perpendicular rays to the structure cannot pass without being deviated, and thus a part of the available illuminating power is lost, and the possibility of viewing objects directly through the structure, as through an ordinary plain sheet of glass, is destroyed. To overcome this objection to ordinary illuminators, I make use of the principle that when light falls on a surface of transparent material at other than a right angle to that surface it is in part reflected and in part transmitted and that the proportion of the reflected light in comparison with the transmitted light increases rapidly as the angle of incidence of the light on the surface is increased; and I construct an illuminator with transparent blades adjusted at such an angle as to secure the desired reflecting action of the surfaces thereof for the light-rays coming from the principal source of illumination and make these blades or plates of uniform thickness or with parallel sides, so that the transmitted light-rays can pass in direct lines into the room.

Various forms of structures may be employed in carrying out the invention.

As shown in the drawings, Figure 1 illustrates one means of embodying the invention in an illuminating-panel. Fig. 2 illustrates a different proportion of the illuminating-plates. Fig. 3 illustrates a form of plates to avoid certain light deflections.

The general purpose of illuminating structures is to secure a more uniform and efficient distribution of light in the room or space to be illuminated than is possible without

their use. In windows opening on narrow streets, alleys, courts, light-wells, &c., the larger proportion of the light available for daylight illumination comes only from the opening toward the sky at the top of the street or well and ordinarily falls directly on the floor at the foot of the window-opening, where, owing to the usually non-reflective character of the floor material, it is lost for general illuminative purposes. Illuminating structures are generally so designed as to receive this light, and instead of allowing it to pass directly through unchanged in direction, as it does in the case of an ordinary window-glass, to deflect it backward into the room toward the part of the space in which an increased illuminating effect is desired; but it also frequently happens when windows are near the top of the building or open on a wide well-lighted street that a large amount of light comes from directions nearly perpendicular to the window-opening, as well as from the sky, and it is evidently desirable to be able to utilize this light, as well as that coming from above. It is also in many cases desirable to obtain such a structure that while it acts as an illuminating structure when placed in a window or other opening it will still not obstruct direct vision through such an opening, but will allow objects to be viewed through it with the same facility as through an ordinary plain sheet of window-glass. This requires a structure of such a nature as to deflect rays coming from directions considerably inclined to the plane of the structure and at the same time allow those coming from directions more nearly perpendicular to said plane to pass unchanged in direction. To secure such a structure is the object of my present invention.

In the construction of Fig. 1, C C are the transparent plates, with parallel faces set in each instance at such an angle to the general direction of the light-rays falling on the faces of the plates from the principal source of illumination that both the upper and lower faces shall act to a greater or less extent as reflecting-faces. At the same time, owing to the transparency of the plates, they permit the direct passage of rays of light in other di-

rections with but little loss from reflection. Thus a ray of light falling from above on one of the plates—say in the direction of the line a a —is reflected in part in the direction of the line a^2 and passes in part through the plate in the direction a' , parallel to its initial direction, falls upon the next lower plate, and is there reflected in part into the room and in part passes to the plate below. By a series of such reflections nearly all of the rays a are finally reflected horizontally, or nearly so, into the room. Rays approximately horizontal, such as those in the direction b b^4 b^5 , are also reflected in part and in part pass through the plates. Thus the ray falling in the direction b is partially transmitted unchanged in direction and partially reflected in the direction b^2 onto the upper face of the next lower plate and is there again reflected in part on a line b^3 , parallel to b , and in part transmitted. In this case also nearly all of the light is by these successive reflections ultimately directed into the room along lines parallel to the original direction of incidence. Rays, such as b^4 , which fall on the reflecting-strips at nearly normal incidence are almost completely transmitted, a very small proportion being reflected. The edges of the blades, although sometimes narrow, receive rays of light from the direction d , and these are totally reflected by the upper and lower faces of each plate in succession and are directed through the body of the same, as indicated by the zigzag lines, and finally pass from the opposite edge in the direction d' , parallel to d . Such plates, therefore, act as illuminating-plates for rays coming from above and as ordinary window-panes for rays nearly perpendicular to the plane of the structure. One can therefore look through such a pane with equal facility to that with which he looks through an ordinary pane of plate-glass. The plates C may be secured in position in any suitable manner. I have shown them combined with glass guard-plates B B, which exclude dust, &c., and thereby preserve the faces in proper condition, the whole being secured and sealed in a frame A. In some instances, however, the plates C may be on one side of a plate B, as shown in Fig. 2, the other side uncovered, but being sealed when the article is applied at this side to the plate of a window.

Where it is desired that the rays entering nearly horizontally shall all pass from the structure in the same direction, the upper or lower edge parts of the blades extending above or below the horizontal lines and forming prisms 2 are objectionable, as in such case a ray entering in the direction c , Fig. 1, is refracted

in the direction c' . This may be effectually overcome by cutting away these prismatic edge parts, as shown in Fig. 3. Another remedy which may be applied for certain angles of inclination of the plates consists in extending the edge of one blade to such a height as to overlap the position of the lower edge of the blade above, (see Fig. 2,) so that the prisms 2 of one blade correct the deflections of the prisms 2 of the other. Naturally I avoid all of these defects so far as possible by making the blades as thin as practicable, and thus present as little edge surface to the light as may be.

It will be seen that by the arrangement of parallel but separated transparent blades, each with parallel faces, the rays of light passing to either face of any blade are both reflected or transmitted to other blades, and finally all with little loss emerge from the inner side of the structure, while those which fall upon the edges of the plates are also received at the inner side of the structure. It will also be evident that the upper and lower reflecting-faces and the edges of the plates are effectually protected by the plates C being sealed in the frame between the plates B B.

I will not here claim, broadly, arranging illuminating-plates within a sealed case; but I claim—

1. In an illuminating structure, a series of parallel transparent plates each with parallel faces and parallel edges arranged one above the other, inclined upward toward the light-receiving face of the structure and separated by a distance exceeding the thickness of the plates, substantially as set forth.

2. In an illuminating structure, a series of inclined, parallel transparent plates arranged one above the other, and separated by a distance greater than the thickness of the plates, the edges of each plate being substantially perpendicular to the general plane of the structure, substantially as and for the purpose described.

3. The combination in an illuminating structure, of a series of inclined, parallel, transparent plates arranged one above the other, each with parallel faces and parallel edges and separated to permit light-rays to fall upon the surfaces of the plates, and transparent side plates sealed against the edges of the former plates, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANK L. O. WADSWORTH.

Witnesses:

CHARLES E. FOSTER,
 W. CLARENCE DUVAL.