

(No Model.)

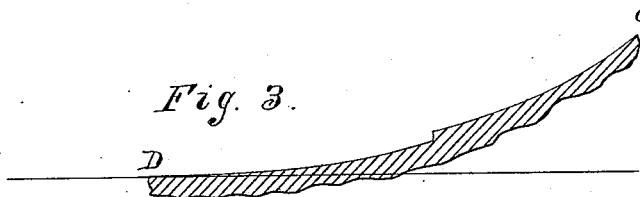
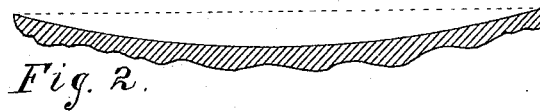
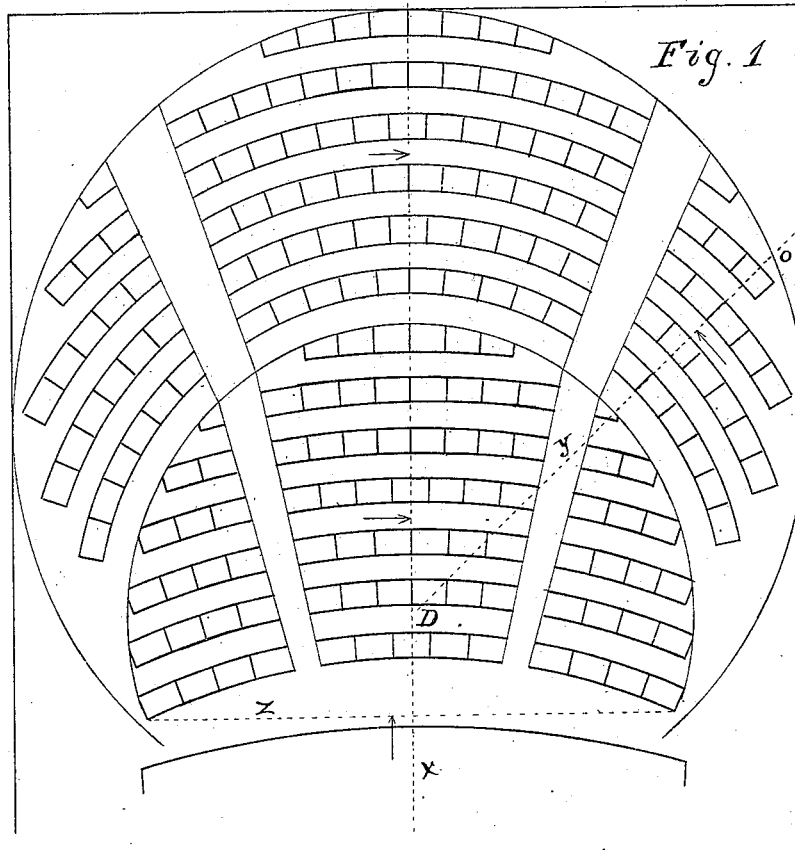
2 Sheets—Sheet 1.

L. H. LEMPERT.

METHOD OF SEATING AUDITORIUMS.

No. 304,532.

Patented Sept. 2, 1884.



Attest:

C. E. Orr.
L. E. Whitmore.

Inventor:

Leon H. Lempert,
By C. B. Whitmore,
Atty.

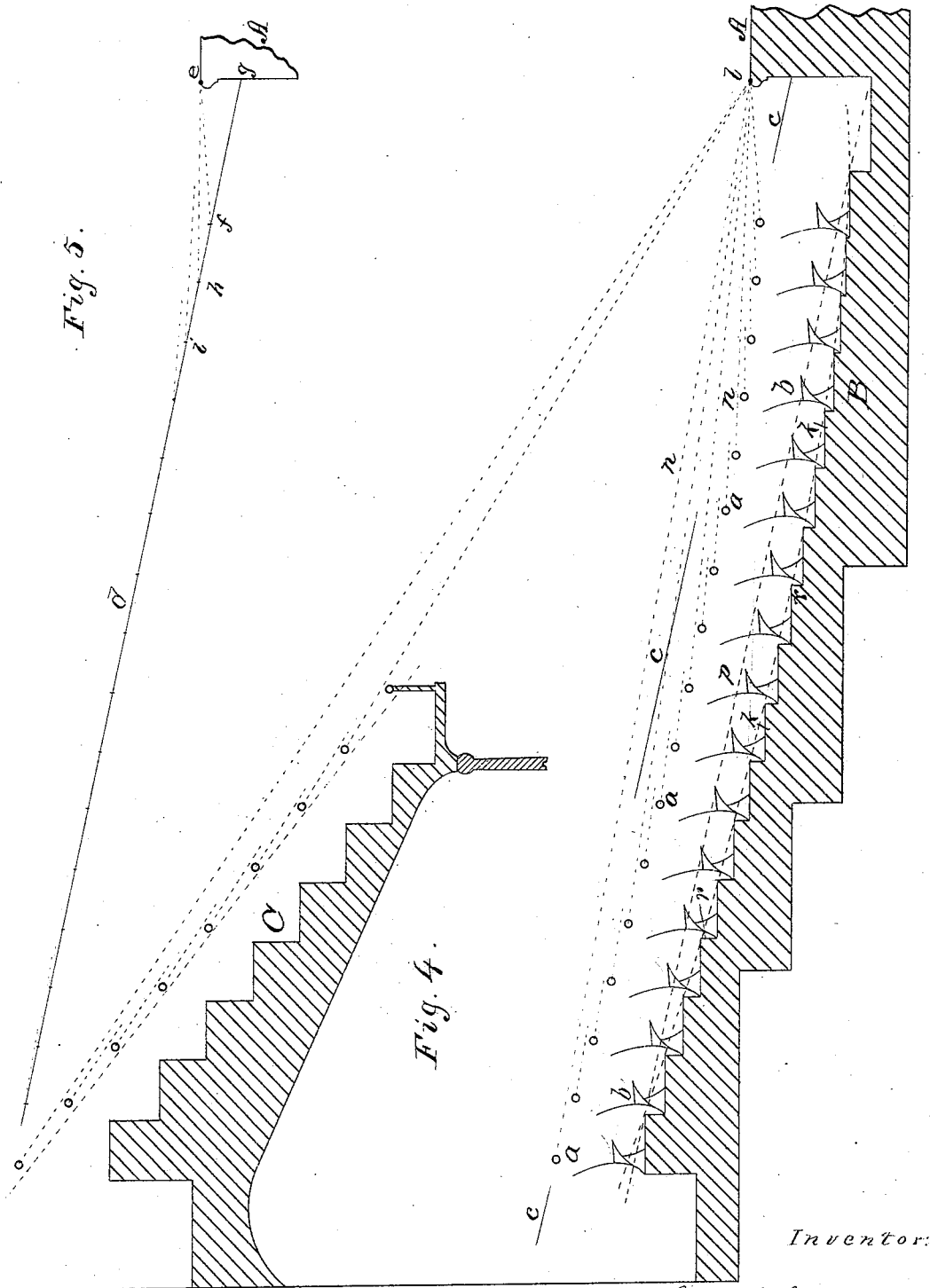
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UNITED STATES PATENT OFFICE.

LEON H. LEMPert, OF ROCHESTER, NEW YORK.

METHOD OF SEATING AUDITORIUMS.

SPECIFICATION forming part of Letters Patent No. 304,532, dated September 2, 1884.

Application filed December 24, 1883. (No model.)

To all whom it may concern:

Be it known that I, LEON H. LEMPert, of Rochester, in the county of Monroe and State of New York, have invented a new and useful
5 Improvement in the Method of Seating Auditoriums, which improvement is fully set forth in the following specification and accompanying drawings.

The object of my invention is to improve
10 the method of seating the auditoriums of theaters, opera-houses, churches, lecture-rooms, school-rooms, and other like places of instruction and amusement, by means of which each auditor, when seated therein, may be better
15 enabled to view the stage or rostrum than is possible when seated in an auditorium having the seats arranged in the ordinary manner; and the invention consists in arranging the rows of seats relatively one above another in
20 such new and novel manner that, with a comparatively-small rise for each row of seats over the row immediately in front, each member of the audience may enjoy an unobstructed view of both the stage and audience, which
25 new arrangement of seats and underlying floor is fully described hereinbelow, and more particularly pointed out in the claims.

Referring to the drawings, Figure 1, Sheet 1, is an outline plan of the parquet and dress-
30 circle floors of a theater, for instance, showing the seats arranged in circular tiers in the usual manner; Fig. 2, a cross-section of the parquet-floor, taken on the dotted line z in Fig. 1, showing the concavity in said floor; Fig. 3, a section of both floors, taken on the
35 dotted line y in Fig. 1, showing a concavity in each; Fig. 4, Sheet 2, an enlarged view of a central section of an auditorium-floor, taken on a line at right angles with the front line of
40 the stage, represented by the dotted line x in Fig. 1, showing a general concavity in the floor, the arrangement of the seats, &c., and showing also the gallery, to which my improved method of seating is also applied; and
45 Fig. 5, a detached view, the use of which will presently be seen.

Heretofore the floors of auditoriums have been made either horizontal or in the form of
50 inclined planes, rising as they recede from the stage or rostrum. The latter form of floor with the seats correspondingly elevated mani-

festly affords the audience the better view of the stage; but upon closer investigation it is found that the advantages derived from an equal incline or rise of the floor and seats are
55 not uniform from the front to the rear seat. This is on account of the differences in the angles formed by the lines of sight of the respective auditors from front to rear with the line drawn parallel to the floor and passing
60 through the eye of a front and rear auditor, respectively, or the line corresponding to the average incline of the floor and seats. It is found that when the seats are based upon an
inclined plane in the usual way the line of
65 sight of the person second from the stage passes above the head of the one in front of him, but that the line of sight of the person third from the stage passes at a less distance
70 above the head of the one second, and that these distances between the lines of sight of the respective auditors and the heads of the persons in front rapidly diminish as the distances of the auditors from the stage increase.
75 The result of this is that the view of the persons seated toward the middle of the room and thence to the rear seat is obstructed by the heads and head-coverings of those in front unless the rise of the floor and seats toward
80 the rear is made inconveniently great. I obviate this difficulty by changing the form of the floor of the auditorium from that of an inclined plane to a concavity or to the shape of a shallow bowl divided at or near its axis; or
85 I give it such a shape that there is an incline from all sides toward a point immediately in front of the stage, by means of which the advantages of the rise or elevation of the floor and seats are equalized and divided uni-
90 formly between all the seats of the auditorium. This will be readily understood by observing the figures of the drawings.

In Fig. 4 the small circles a represent the respective heads of auditors seated in chairs
95 b , arranged on the respective platforms k of the floor B, in a line running back from the orchestra.

The dotted lines n represent the respective lines of sight of each person leading to the stage A at l , passing at a uniform distance
100 over the heads of those in front.

It will be seen from the dotted line p of the

figure, that when the seats are arranged with reference to elevation or vertical lines so as to bring the heads of all the auditors in such relative positions that each person may view the stage with equal facility over the head of the one immediately in his front, said seats will not lie in a right-oblique line, but in a curved line of a vertical plane, concaved upward. I assume this to be the true line to be given the floor and seats in order to secure to each auditor an equal opportunity to view the stage, and arrange said floor and seats accordingly. The broken line *c* is supposed to be drawn through the eye of the respective auditors nearest to and farthest from the stage; and if the head of any intermediate auditor were raised to that line it is clear that it would obstruct the sight of one or more of those behind him. By conforming to the curve, as described, the head of each person is out of the way of the sight of those in the rear. By consulting Fig. 5, this matter will be further illustrated. The line *d* of said figure corresponds in position and inclination to the broken line *c* of Fig. 4. The angle *efg* is the angle the line of sight of the first observer forms with the line *d*; the angle *ehg*, the angle the line of sight of the second observer forms with said line *d*, &c., going back from the stage. It will be observed that these angles rapidly diminish in degree as they recede from the stage, those formed near the farthest end of the line *d* being very acute, the lines of sight therefrom and the line *d* being nearly parallel.

By arranging the seats in a vertical curve, as shown, only a comparatively moderate elevation of the floor and seats at the back part of the room is required, compared with the elevation necessary in the old way of seating. This is of great importance in the matter of planning and building auditoriums, for it allows the gallery to be placed relatively much lower and makes it easier of access for the audience, while much less height of ceiling is needed in the room. In this plan of shaping the floor of and seating auditoriums, a vertical plane passing through any distant point of the floor and the point D, for instance, Fig. 1, immediately in front of the middle point of the stage, would form a curved section, as shown in Fig. 3, which is a section of the floor from *o* to D on the dotted line *y*. This permits a person sitting in any seat to see every member of the audience, as well as the stage, without rising from his seat, which cannot be done when the auditorium is seated according to the old method.

It will be observed from Fig. 4 that the

risers *r* of the floor increase in altitude as they recede from the stage, this being necessary in order to give to the floor and seats the proper curvature. These elevations may be made in the order of an arithmetical progression—as, for instance, by adding the common difference of one-half an inch to any one to form the one next in rear thereof; or they may be made to increase irregularly toward the rear, the essential object being to so seat every person at such relative elevation as to be able to see the floor of the stage over the head of the one immediately in front of him.

The rear seats of an auditorium, when a concert is to be listened to or a play to be viewed, are to many preferable to the front seats; but, owing to the unfavorable facilities for seeing the stage or rostrum in auditoriums seated after the present style, audiences are compelled to procure seats well toward the front, notwithstanding their undesirable proximity to the stage. With the seats arranged according to the plan herein described, the rear seats are rendered desirable.

The method of vertical-curve seating here described is equally well adapted to the gallery *c*, as will be readily understood by referring to the small circles and dotted lines of the same in Fig. 4.

I claim as my invention—

1. An auditorium in which the chairs or benches are arranged with reference to vertical lines in such a manner that if a canvas for instance, were stretched over and made to touch the seats of said chairs or benches it would be concaved upward or have substantially the form of a shallow bowl divided upon or near its axis, substantially as shown and described.

2. An auditorium in which the floor (which may be made up of a series of risers and platforms in the usual manner) is made concave in general form, or so that if a canvas, for instance, were stretched over the same and made to touch the upper angles formed by the union of the respective risers and platforms said canvas would be concaved upward or have substantially the form of a shallow bowl divided upon or near its axis, substantially as shown and specified.

3. The floor of an auditorium, consisting of a succession of risers and platforms, in which the risers increase in height from front to rear, substantially as set forth.

LEON H. LEMPert.

Witnesses:

E. B. WHITMORE,
M. D. PHILLIPS.