(No Model.) 2 Sheets—Sheet 1.

E. F. UNDERHILL & V. F. LAKE.

FOLDING SEAT.

No. 267,382. Patented Nov. 14, 1882.

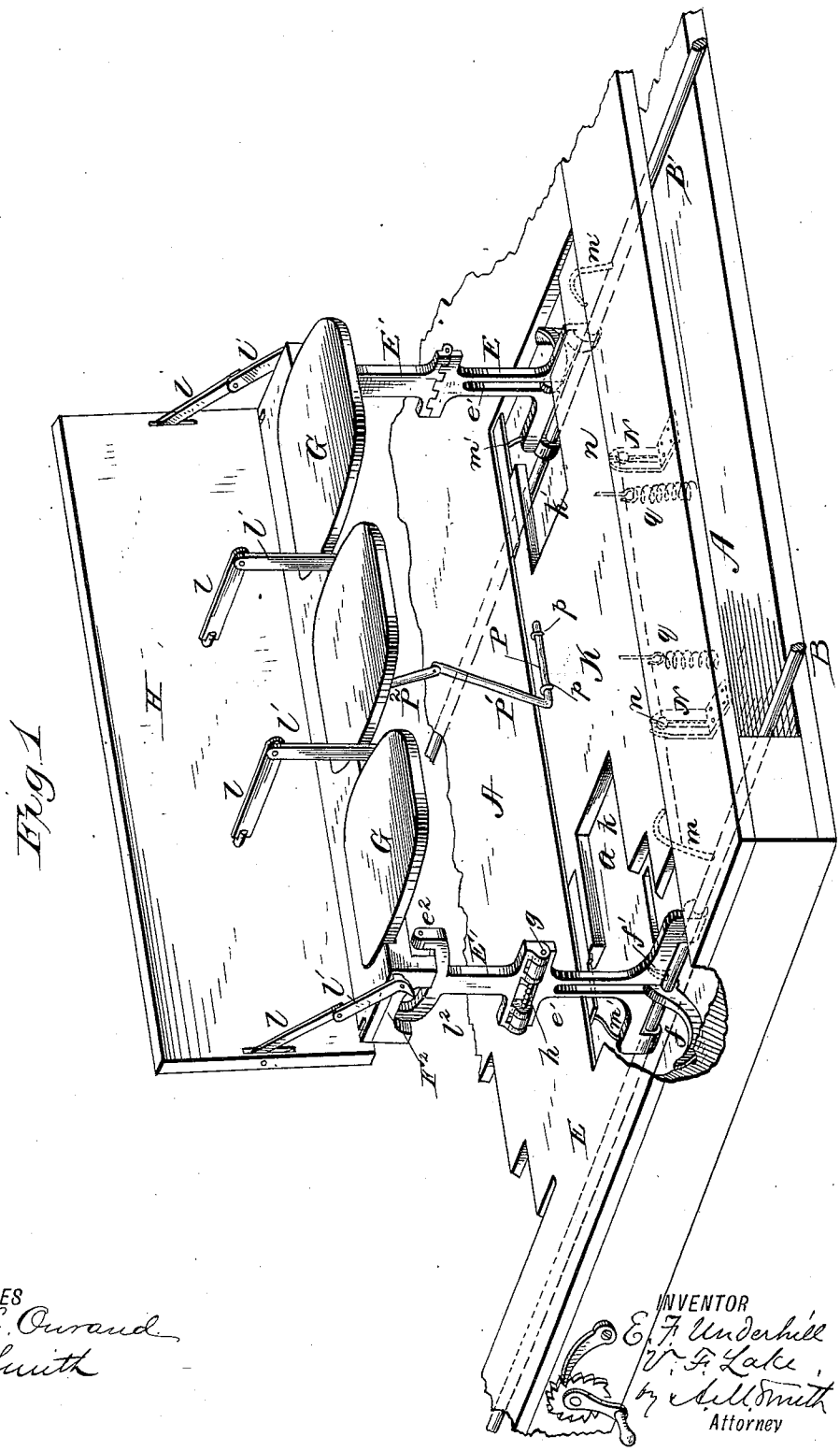


Fig. 1

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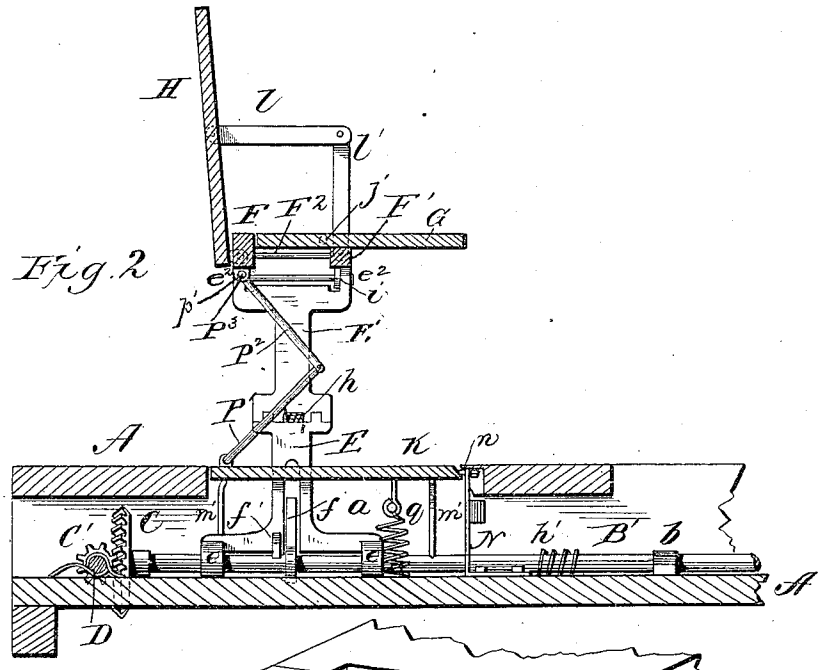
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Fig. 2



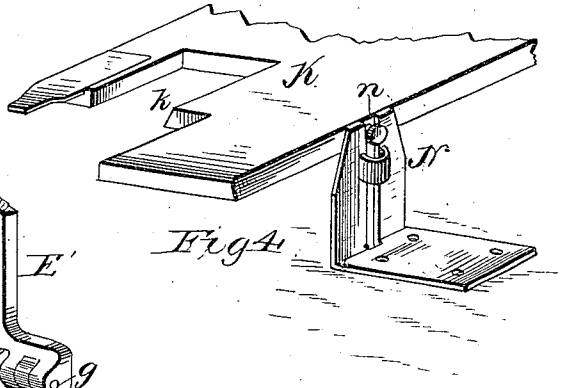
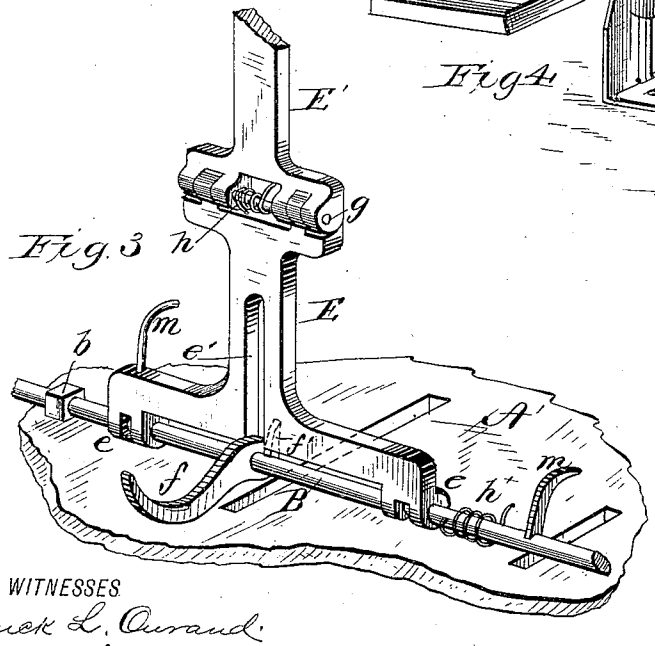


Fig 4.

Fig. 3



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UNITED STATES PATENT OFFICE.

EDWARD F. UNDERHILL AND VINCENT F. LAKE, OF NEW YORK, N. Y.

FOLDING SEAT.

SPECIFICATION forming part of Letters Patent No. 267,382, dated November 14, 1882.

Application filed February 11, 1882. (No model.)

To all whom it may concern:

Be it known that we, EDWARD F. UNDERHILL and VINCENT F. LAKE, of New York, county of New York, and State of New York, have invented new and useful Improvements in Folding Seats, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a perspective view showing a row of three of our improved folding seats and a portion of the flooring recessed to receive said seats and the parts connected therewith. Fig. 2 represents a vertical section through the seat and floor. Fig. 3 is a perspective view of a portion of one of the toggle-links or jointed supports for the seat, showing its connection with its actuating-shaft, and Fig. 4 shows in perspective a portion of the adjustable false cover to the recess in the floor and one of its guiding-brackets.

Our invention relates to an improvement upon the construction of folding seats for theaters, public halls, &c., described in our application filed on or about December 26, 1881; and it consists mainly in certain details of construction and arrangement of the parts thereof for securing greater ease and steadiness in the adjustment of the seat and greater steadiness of support for the same when in position for use, as hereinafter explained.

In the accompanying drawings, A A′ represents a section of flooring recessed for the reception of the folding seat, as described in our former application referred to; or it may be made double, as represented in the drawings, the upper portion or floor having openings *a* formed in it for the reception of the folding seats.

In suitable bearings, *b b*, secured to the upper face of the lower floor, A′, are mounted rock-shafts B B′, arranged at right angles to the rows of seats, and provided at one end each with a bevel-gear, C, engaging with and receiving motion from bevel-wheels C′ on a shaft, D, arranged at right angles to the shafts B B′ and parallel with the rows of seats. The gears on the shaft D are so arranged relatively to the gears on shafts B B′ as to move them in opposite directions—preferably from the top inward toward each other—in lowering the seats, in such manner as to cause the toggle-links supporting the seat to fold inward under the seats. To these shafts, which are arranged at opposite sides of the recess in the floor, the lower links, E, of toggle-joints E E′ are secured, the upper portion, E′, of said links or joints being hinged to the lower face of the seat or seat-frame, as shown.

The links E are provided with sleeves *e* at their lower expanded ends, which surround and are free to turn on the shaft B or B′, motion being imparted to them for causing them to turn with the shaft by means of cams *f* and *f′*, rigidly secured to the shaft. The lower links, E, have vertical slots *e′* in their lower ends, directly over or in the same vertical transverse plane with the cams *f*, which work through said slots, and serve to partly raise or open the toggle-joint by pressing against and acting upon the upper arms, E′, thereof, after which the cam *f′*, arranged upon one side of the slot *e′*, comes in contact with the inner lower face of the arm E and serve to raise the latter and the arm E′ connected therewith into a vertical position. The arms E E′, at their inner adjoining ends, are expanded in width, and are provided with interlocking perforated lugs or ears, through which they are united by a hinge-pin, *g*, the joint being in form similar to a broad butt-hinge operating to prevent the arms from passing beyond or materially beyond a vertical position, in which they are best adapted to support the weight of the seat.

The hinge-pin *g* is provided with a coiled spring, *h*, the ends of which pass through eyes in the arms, or are otherwise arranged to act upon said arms E E′, when folded, with a tension exerted to assist in raising said arms and the seat, but so arranged as to become neutral just before the arms reach a vertical position, and as the arms assume such position to exert a force in the opposite direction sufficient to "break" the joint and permit the arms to assume such position as will bring the weight of the seat into operation for closing or folding the joint.

If preferred, a separate spring may be employed for the latter purpose, so arranged as to act only when the arms are in an upright position for breaking the joint when the shafts

B and B′ are rocked inward for folding the seat.

The shafts B and B′ may be provided with similar springs, h', arranged to exert their force or tension to relieve the actuating mechanism, as far as practicable, of the weight of the seat, and so facilitate the operation of raising and lowering the seat into the receptacle a. The upper ends of the arms E are also expanded in width from front to rear, and provided with upright perforated ears e^2 e^2, through which said end is hinged to pendent lugs i i on the lower face of the seat or seat-frame, as shown.

Where several seats forming a row are united as shown, we prefer to form a seat-frame consisting of rear and forward parallel bars, F and F′, extending the whole length of the row and united by short bars F^2 at their ends and between the seats G, the seats being pivoted at j in said bars, just in rear of the bar F′, sufficiently to permit them to be turned up into a vertical position behind the vertical plane of said bar, which, in connection with the pivots of the seat, serves to support the seat when turned down into position for use. The back H or backs where one is used for each seat is hinged to the rear bar, F, in such manner as to fold over upon the seats, and forms the cover to the opening or recess a and a part of the flooring when folded therein. This back is connected by a jointed link, l l', with the forward seat-frame bar, F′, or with the connecting-bars F^2, said links being pivoted to the back at or near midway of its height.

In the drawings the links at the ends of the row are shown shortened in such manner as to limit the backward throw of the back, permitting it to assume the required position for use, the parts of the jointed link being brought into right line, or thereabout, as shown, while in those between the seats the arms l l' are elongated in such manner that when the back is raised they assume a position approaching a right angle, in which the horizontal part l serves as an arm to the seat, the part l' supporting its forward end. By a suitable arrangement of stops upon the cross-bars F^2, or at other suitable points, the upward or backward throw of the arms l' may be limited in such manner as to adapt the end links also to serve as arms to the adjoining seats.

K is a false bottom to the recess or opening a, either shortened to permit it to pass by and below the plane of the shafts B B′ when the seat is folded into the recess above it in such manner that the arms E E′ of the toggle-joint will fold above it, or it may be notched or cut away at the ends, as shown at k k', to permit said arms to fold through or into it. The false bottom K rests upon curved or cam-shaped arms m m', attached to the rock-shafts B and B′, said arms serving to raise or lower said floor or false bottom as the shafts are rocked for raising or lowering the seats, and when the latter are in position the false bottom is raised in position to act as a part of the floor, flush therewith, filling and covering the recess a. The false bottom K is provided at its edges (shown only on its forward edge, but applicable to both front and rear) with steadying-pins n, working in slotted standards N, secured to the lower floor, A′, and which serve to steady and guide the rising and falling movements of said false bottom; and at or near its rear edge the false bottom K is provided with bearings p for a short transverse rock-shaft, P, provided at one end with an arm, P′, at right angles to said shaft, said arm at its swinging end being pivoted to the swinging end of a similar arm, P^2, secured to a short transverse shaft, P^3, mounted in suitable bearings, p', on the lower face of the seat-frame.

The arms P′ P^2 may be so proportioned as that when the seat is raised into position for use the arms will assume a relation in right-line extension, nearly, one of the other, and the seat thus made to steady and uphold the false bottom at its rear edge, while the arrangement of the rock-shafts P P^3, connected by said arms, serves to prevent lateral vibration of the seat when in position for use.

The arms l' of the jointed links connecting the folding backs with the seat-frame are shown provided at their lower ends, where pivoted to said frame, with angular or bell-crank extensions l^2, which, when the seat is lowered into the recess a, come into contact with pins or projections on the side walls thereof, and serve to break the joint between the arms and to cause the back to be automatically folded over upon the seat into position to act as the flooring or covering to said recess or opening.

Underneath the false bottom springs q are employed, the tension of which is exerted to uphold and support the weight of the floor, and like springs h h', referred to, to relieve as far as practicable the labor of adjustment.

Where a long row of seats is connected with and operated by means of shafts at the sides or ends thereof, intermediate toggle-levers may be used for properly supporting the seat, and these may be connected with the rocking shafts B, or the arms E thereon, in any suitable manner, adapting them to be operated simultaneously with those at the ends of the row.

By mounting the toggle-levers or jointed supports loosely on the rock-shaft, and providing the latter with cams or projections acting on the levers only for raising them, as described, the seat and toggle-levers are adapted to remain up in case of obstruction, when the shafts are operated for lowering them.

Having now described our invention, we claim—

1. A floor provided with a recess, and a seat folding therein, in combination with rock-shafts arranged in the recess, toggle-levers connecting said seat and rock-shafts, and mechanism, substantially as described, for raising said seat into position for use.

2. A floor provided with a recess, and a seat connected with the floor and folding into said recess, in combination with rock-shafts, tog-

gle-levers mounted loosely thereon, and projections on said shafts for actuating the levers with a positive movement in raising the seat, substantially as described.

3. A floor provided with a recess, a movable false bottom to said recess, and a seat connected with the floor and folding into said recess over the false bottom, in combination with rock-shafts arranged in the recess, toggle-levers connecting said seat and rock-shafts, and cam-projections on the latter for raising the seat and false bottom, substantially as and for the purpose described.

4. A seat, in combination with levers folding into a recess in the floor, and springs applied to said levers, and arranged, as described, to aid by their tension to lift the seats when folded and to aid in folding the jointed supports when the seat is raised.

5. A floor provided with a recess, a seat, and jointed arms or supports adapted to fold into said recess, in combination with rock-shafts for raising said seat and its supports, and springs applied to the rock-shafts to aid in raising the seat, substantially as described.

6. A floor provided with a recess, a movable false bottom to the recess, a seat folding into said recess, and mechanism for raising the seat and false bottom, in combination with a jointed support connecting the seat and false bottom for preventing lateral vibration of the seat, substantially as described.

7. The combination, with a floor provided with a recess, of the movable false bottom to the recess, the seat folding into said recess, toggle-levers connecting the seat with rock-shafts arranged in said recess, a jointed connection between the seat and false bottom, mechanism connected with said shafts for simultaneously raising the seat and false bottom, and springs applied to said rock-shafts and toggle-levers, substantially as and for the purpose described.

In testimony whereof we have hereunto set our hands.

EDWARD F. UNDERHILL.
VINCENT F. LAKE.

Witnesses:
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ROBT. HERTING.