(No Model.) 2 Sheets—Sheet 1.

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

FOLDING SEAT FOR THEATERS.

No. 266,226. Patented Oct. 17, 1882.

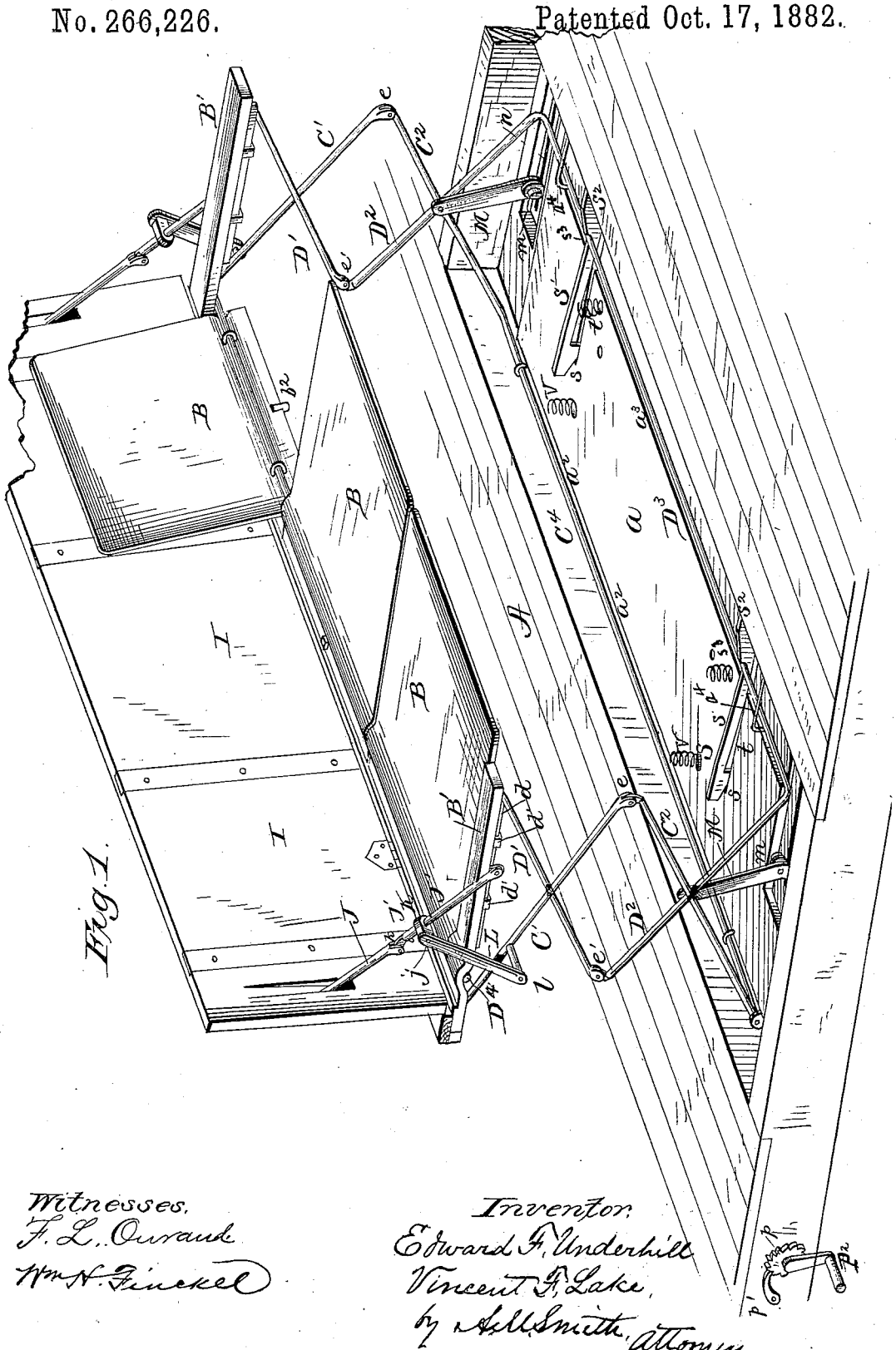

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

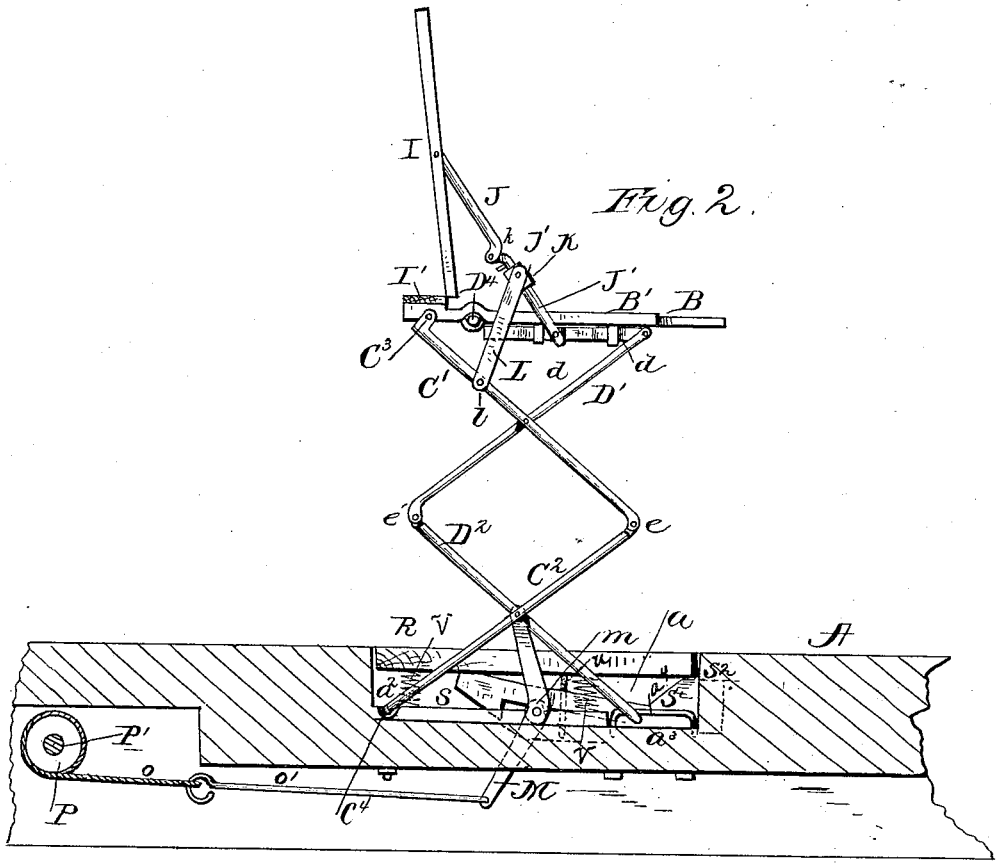
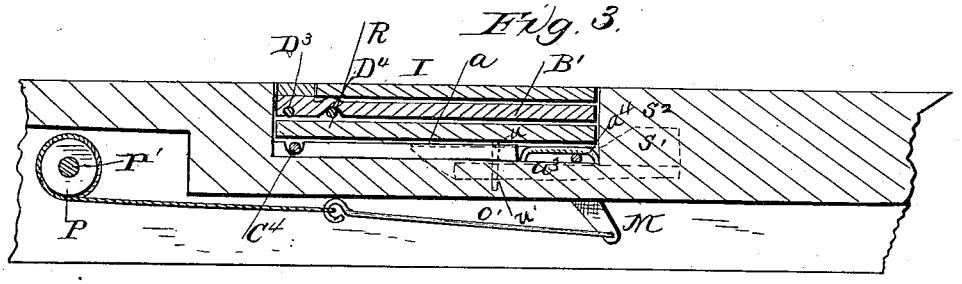


Fig. 3.



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UNITED STATES PATENT OFFICE.

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

FOLDING SEAT FOR THEATERS.

SPECIFICATION forming part of Letters Patent No. 266,226, dated October 17, 1882.

Application filed December 27, 1881. (No model.)

To all whom it may concern:

Be it known that we, EDWARD F. UNDERHILL and VINCENT F. LAKE, both of the city, county, and State of New York, have invented new and useful Improvements in Folding Seats for Theaters, Public Halls, &c., 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 of a seat or row of seats illustrating our invention, with the inner adjustable foot-board or false floor removed to show the arrangement of parts. Fig. 2 is a vertical section through the folding seat and a portion of the recessed flooring supporting the same, showing the seat in position for use; and Fig. 3 is a similar view, showing the seat folded into the recess in the floor.

Our invention relates to the class of seats adapted to fold into a recess in the floor, being an improvement upon the invention for which Letters Patent were granted to the undersigned Edward F. Underhill, November 15, 1881; and it consists in the combination of the jointed links therein described with transverse rock-shafts, which serve to prevent lateral vibration of the links and of the seat supported thereon, enabling us to dispense with the vertical guiding and steadying rods described in said patent.

It further consists in a novel arrangement of levers, in connection with the jointed links for actuating them and raising the seat; in adapting said seat, when raised into position for use, to be folded up or back to facilitate the passage of persons by it, whether for ingress or egress; in a novel manner of connecting the links with the toggle-links supporting the back of the seat; in the combination, with the recessed flooring and the seat folding therein, of an adjustable false flooring adapted to rise to a level with the flooring when the seats are raised into position for use and to sink into the recess, so as to permit the latter to accommodate the seat when folded, and in means for effecting the adjustment of said false bottom or flooring simultaneously with the adjustment of the seat.

The construction adopted for carrying out these several features of our invention in practice will be best understood from the following description with reference to the drawings, in which—

A represents the flooring, provided with recesses *a* (only one of which is shown in the drawings) for the reception of the seats when folded.

C′ C² and D′ D² are jointed links, arranged in pairs and on opposite sides of the seats or row of seats, as shown in Fig. 1, the links C′ and C² being pivoted to each other, and the latter, at their lower ends, are rigidly connected with, or they may form angular extensions of, a transverse rod or rock-shaft, C⁴, mounted in a groove, a^2, in the lower wall or bottom of recess *a*, being secured therein by eye-bearings or other suitable means permitting its rocking movement. The lower ends of the arms D² of the jointed links D′ D² are connected in a similar manner with a rock-shaft, D³, let into a recess, a^3, in the flooring of the recess or receptacle *a*, in such manner as to depress it below the surface of said flooring, while providing for a sliding backward and forward movement of the shaft D³, held in the socket or recess a^3 by loops or slotted brackets a^4, said movement permitting the opening and closing of the jointed links. The links C′ C′ are also connected at their upper ends by a transverse rod or rock-shaft, C³, let into a groove in the lower face of a transverse bar or back strip, I′, to which the folding backs I are hinged.

B′ are arms or side bars, rigidly connected with the back strips, I′, at their ends, and at the sides of the seats B, or at each end of a row thereof, as shown. These arms are recessed or have transverse grooves *b* on their lower faces, at a point in front of the back I, for the reception of a second transverse rod or bar, D⁴, to which the seat or seats are pivoted in such manner as to permit them to fold up against the back I, when required, for facilitating the passage of persons to or from the seats arranged in rows. The upper ends of the links D′, like the upper ends of links C′, may be connected by a transverse rod or rock-shaft sliding in loops on the lower faces of arms B′; but for the purpose of giving increased space between the rows when the seats are folded up against the backs, as explained,

we prefer to dispense with such rods and to pivot the links to the forward ends of longitudinally-sliding rods or bars *d d*, moving in guiding loops or ways *d' d'*, formed upon or secured to the lower faces of the arms B', as by this arrangement the arms B' can be shortened and made to terminate at their forward ends at a point at or nearly vertically over the joint between the link D' and slide *d*, when the seats are in position for use, as shown in Fig. 2, thus giving more space between the arm or bar B' and the seat in front for ingress to or egress from the rows of seats.

The back I is connected by toggle-links J J' with the arms or side bars, B', and the arms J' of said links have short sleeves K sliding upon them, connected each, by a swiveling joint at *j'*, with one of the links L, which at their lower ends are pivoted to the links or arms C' of the rock-shaft C^3 at *l*. The links or arms C' and D', and also the links C^2 and D^2, are pivoted to each other midway of their length, and together form a lazy-tongs at each side of the seat or row of seats, as described in the patent referred to, and operating in a similar manner, except that, being rigidly connected with transverse rock-shaft, as described, lateral vibration of the links and of the seats upheld thereby is prevented.

The toggle-links J J', supporting the backs I, are by preference so proportioned that when the seats are in position for use the joint at *k*, between the parts J and J', passes below the line of the link, and serves by its construction to lock the back against accidental folding, while in folding the lazy-tongs supporting the seat the links L press upward on the toggle-link J J', "breaking" the joint and pulling the back forward, causing it to automatically fold over upon the seats B and arms or side bars, B', the swiveling eye or sleeve K sliding on the link J' to accommodate such folding action.

The arms or links C^2 D^2, at or near their points of intersection, have a bent lever, M, (one on each side of the seat or row,) connected with them, preferably by the same pivotal bolt that connects said arms, as shown, said lever extending down through a slot, *n*, in the floor of the recess *a*, and being provided at or near its angle or bend with a friction-roller, *m*, running in a groove or track at the side of the slot in the floor. The lower end of lever M is connected by a chain, *o*, or by a link, *o'*, and chain, as shown, with a drum, P, on a shaft, P', which may be operated by means of a crank, P^2, for raising the seat, a ratchet-wheel, *p*, and pawl *p'* serving to hold the shaft, and the seat or seats connected therewith, when the latter are raised into position for occupancy. In this operation the roller *m* acts as a moving fulcrum, traveling back in its groove or track until the portion or arm of lever M above it, and connected with the lazy-tongs, assumes a nearly-vertical position, and one best adapting it to support the seat, and in which it is maintained with the smallest possible expenditure of power, while at the same time adapting it to act automatically to lower the seat when released.

It will be apparent that the shaft or windlass P may be located at any convenient point relatively to the seats to be operated by it, and that it may be operated by any suitable power, according to the number of seats or sections of seats to be operated upon simultaneously, and also that by a suitable arrangement of shafts and of mechanism connecting these shafts with the motor all the seats of a hall, theater, or other public building may be simultaneously raised or lowered.

The recess *a* is of greater depth than is requisite for the reception of the seat and its folding back, which, when folded, forms a flooring to said recess, flush on its upper face with the upper surface of floor A, as shown in Fig. 3, and within it is placed a second or false flooring, R, supported upon sliding bars S S', working in longitudinal grooves *t* and *t'* in the floor or bottom of the recess *a*. (See Fig. 1.) These bars are provided at their outer or rear ends, on their lower edges or sides, with inclined faces or cam-shape formations *s*, which are acted upon as the bars move backward by inclined faces or bottom walls at the rear ends of the slots, causing the bars to rise as they move backward, raising the false bottom R, and to fall, lowering said flooring or false bottom, as the bars are drawn forward.

The bars S S' are provided on their forward or inner ends with rising inclines *s'*, terminating in horizontal plane edges s^2, the inclines *s' s'* acting on the forward edge of the false bottom R for raising it until it is flush with the surface of floor A on its upper face, when the horizontal edges are drawn under and serve to support the forward edge of the false bottom R, as the rear or outer ends of said bars do its rear edge. These bars are notched or provided with vertical slots at s^3, open on the upper edges of the bars, in which the sliding rod or rock-shaft D^3 rests, said rod or shaft serving, as it moves backward or forward in the raising or lowering of the seats, to draw the bars backward or forward with it, and so to raise or depress the false flooring R until it rises to the level of the floor A, when the seats are raised, or sinks to allow the reception of the folding seat and back within the recess *a* when the seat is folded or lowered therein.

The false bottom has pins *u u* on its lower face, which enter guiding sockets or holes *u'* in the floor of the recess *a*, and serve to guide and steady its movements and to keep it in place in said recess.

The inclines or cams *s* and *s'* may be provided with friction-rollers, or they may rest upon and move over such rollers suitably arranged at the points of frictional contact, thereby facilitating their movement. The arrangement of the inclines *s* and *s'* is such as to raise the false bottom R into position flush with the floor A before the seats are fully raised into position for occupancy, the latter part of the

throw of rod D^3 serving to move the cams *s* over horizontal ways, and also to draw the horizontal portions s^2 under the bottom R for properly supporting it.

The joints *e e'* between the links or arms C' and C^2, and also those between the links or arms D' and D^2, are formed in slight angular projections at the ends of said arms, making the pivotal point sufficiently eccentric to the lineal or axial center of said arms to adapt them to fold snugly one upon the other, the lower ones folding into grooves or recesses in the bottom of recess *a*.

The rear edges of the folding seats may be provided with angular extensions or arms, as indicated at b^2, which, when the seat is in position for use, rest under the back strip, I', and serve to support the seat in said position.

The bottom of recess *a* may have pockets or recesses for the reception of springs V, of spiral or other suitable form, which serve to sustain, in part, the weight of the false bottom R, facilitating its upward movement, and similar springs may be interposed between or under the arms or links C' C^2 and D' D^2 of the lazy-tongs, for sustaining, in part, the weight of the seat, seat-frame, and back, and facilitating in like manner the raising of the same.

Having now described our invention, we claim—

1. A recessed floor, in combination with a seat hinged thereto and folding into a recess in said floor, hinged folding arms or links for adjusting and supporting said seat, and rock-shafts rigidly connected with said links for preventing lateral vibration, substantially as described.

2. The combination, with a recessed floor, of a seat hinged to said floor and folding into a recess therein, compound toggle links or levers for adjusting and supporting said seat, and a lever having a movable fulcrum for adjusting said supporting-links.

3. A recessed floor, in combination with a seat hinged to said floor and folding into a recess therein, and provided with a folding back, folding supports for said seat, jointed links connecting the sides and folding back of the seat, sleeves sliding on said folding links, and pivoted links connecting said sleeves and the folding seat-supports, substantially as and for the purpose described.

4. A recessed floor and a seat hinged to said floor and folding into a recess therein, and provided with rigid side frame-bars, in combination with slides moving in ways on said bars, and folding links connected therewith, substantially as and for the purpose described.

5. A recessed floor, in combination with a seat hinged to said floor and folding into a recess therein, a false bottom to said recess, and mechanism connected with said seat and false bottom, whereby when the seat is raised or lowered said false bottom is raised or lowered simultaneously with the seat and its horizontality preserved, substantially as described.

6. The combination, with a recessed floor and a seat hinged thereto and folding into a recess in said floor, of an adjustable false bottom or flooring to said recess, and mechanism for simultaneously adjusting the front and rear sides or edges of said false bottom, substantially as described.

7. A floor provided with a recess, in combination with a seat hinged to said floor and folding into said recess, an adjustable false bottom to said recess, and springs for sustaining, in part, the weight of said seat and false bottom, substantially as described.

In testimony whereof we have hereunto set our hands this 21st day of December, A. D. 1881.

EDWARD F. UNDERHILL.
VINCENT F. LAKE.

Witnesses:
W. H. McINTIRE,
CHAS. W. RANDALL.