May 2, 1944. I. R. BROMAGEM 2,347,931

THEATER SEAT

Filed April 12, 1940

Fig. 5.

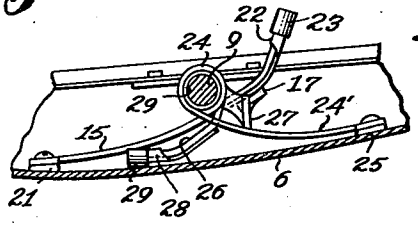


Fig. 1.

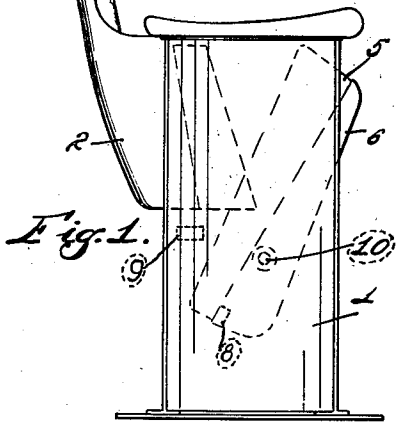


Fig. 3.

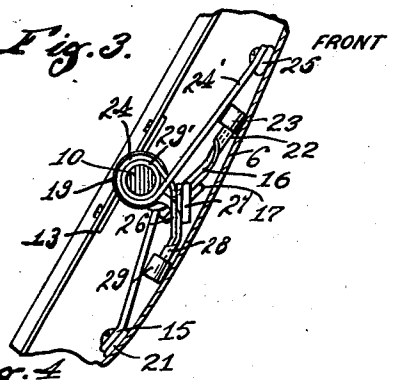


Fig. 4.

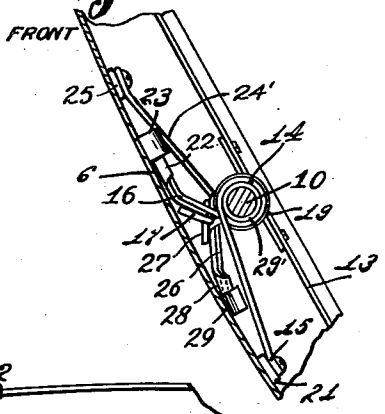
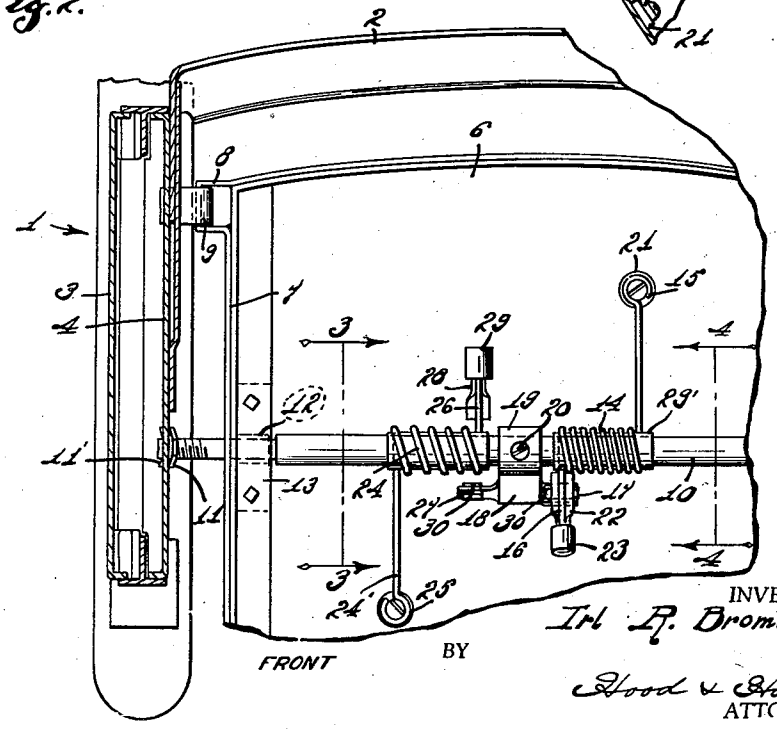


Fig. 2.



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THEATER SEAT

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Application April 12, 1940, Serial No. 329,204

9 Claims. (Cl. 155—85)

The present invention relates to improvements in theater and auditorium chairs and chairs of like character.

It primarily has for its object an improvement in means for automatically raising the chair seat from a horizontal position as soon as the seat is relieved of the weight of the occupant.

A further object of the invention is to provide means for raising a chair seat from a horizontal position upon relieving the seat of its weight, while, at the same time, preventing the seat from contacting the back of the chair when the seat is so raised and, as an incident to such an arrangement, preventing the seat from oscillating unduly when it moves to its raised position.

Another object of the invention is to provide means whereby the raised position of the seat may be readily adjusted.

Other objects and advantages of the invention will appear more fully hereinafter in the appended specification and claims.

Referring to the structure shown in the accompanying drawing which illustrates an embodiment of my invention,

Fig. 1 is a side elevation of a theater chair embodying my invention;

Fig. 2 is a horizontal sectional view showing the seat in plan, with the seat cushion removed and the seat in horizontal position;

Fig. 3 is a detail section on the line 3—3 of Fig. 2 showing the action of the springs, however, when the seat is in its raised position;

Fig. 4 is a section on the line 4—4 of Fig. 2 showing the seat in its raised position; and

Fig. 5 is a view similar to Fig. 3, but showing the seat in its substantially horizontal position.

In the illustrated embodiment of the invention, the chair includes a pair of side standards 1 connected by a suitable back 2. The side standards are preferably formed of sheet metal panels 3 and 4. Between these standards 1, the seat 5 is mounted. The seat preferably comprises a seat pan 6 which is formed from sheet metal and provided with upturned sides 7. Extending laterally from these sides are bosses or lips 8 which engage stops 9 on the inner panel 4 of the standards 1 to prevent the seat from moving past the horizontal position when lowered. A shaft or rod 10 extends across the seat pan 6 and through the side flanges 7, being secured in the panels 4 of the standards by a pair of clamping nuts 11 and 11'. Each pair of nuts firmly clamps or grips each of the panel members 4 between the same so as to hold the rod not only against lateral displacement but also against any rotative movement, although by loosening the two nuts 11 which are accessible from the exterior of the panel 4, the rod may be rotated through a desired range of adjustment. In addition to passing through openings in the flanges 7 of the seat pan 6, the rod 10 also passes through suitable bearing sleeves 12 secured on the under side of inwardly extending bracing flanges 13 secured to the side walls 7 of the seat pan. At the point where the rod passes through the sleeves 12, I preferably arrange fibre bearing sleeves which are prevented from lateral movement in one direction by shoulders formed on the rod.

The above arrangement makes a silent hinged joint on which the seat pan 6 can rock.

For raising the seat from a horizontal to a vertical position, I provide a coiled spring 14 which is coiled around the rod 10 and has one end 15 bearing downwardly on the inner surface of the pan 6 toward the rear. The opposite end 16 of this spring, when the seat is in its horizontal position, bears against one end 17 of a cross stop 18 carried by a sleeve 19 fixed on the shaft 10. This sleeve 19 is preferably fixed on the shaft 10 by means of a suitable pin 20 which extends through the sleeve and shaft. The spring 14, being under its greatest tension when the seat is in its horizontal position with its end 15 bearing against the seat and its opposite end 16 held against unwinding movement by the abutment member 17, will tend to rotate the seat pan 6 moving the rear end of the pan downwardly and the front end upwardly thus moving the seat into its raised position. For silencing purposes, the end 15 of the spring 14 is provided with a rubber button 21 which contacts the surface of the pan 6 and the end 16 of said spring has secured thereon a metal clip 22 carrying, at its outer end, a preferably sponge rubber bumper 23. The rubber bumper 23 on the end 16 of the spring, is adapted to engage or contact the seat pan when the seat has been moved to a selected raised position.

Acting in opposition to the action of the spring 14, when the seat has reached its predetermined raised position, I provide a second spring 24 which has its end 24' bearing on the front portion of the pan. This end, like the end 15 of the spring 14, is provided with a rubber bumper or button 25. The opposite end 26 of this spring is adapted, when the seat moves to its selected raised position, to engage an abutment 27 similar to the abutment 17. This end 26 of the spring 24 is likewise provided with a clip 28 provided with a sponge rubber bumper 29. This spring 24 acts as a return spring and in opposition to

the spring 14 when the seat has been moved past its vertical position. The two springs 14 and 24 are both under tension when the seat is in a position of equilibrium. That is, the springs 14 and 24 act in opposition to one another when their ends 16 and 26 are simultaneously in contact with the abutments 17 and 27, respectively, and when the parts are in such position, they may be said to be in a position of equilibrium. Due to their opposite effects, the seat is then in a balanced position and is not biased to move in either direction under the stress of the springs. However, as soon as the seat is lowered, the spring 14 is placed under a return stress while the spring 24 is relieved of stress, and when the seat passes beyond its predetermined raised position, the spring 24 is placed under a return stress and the spring 14 is relaxed.

By this arrangement, I provide means for quickly and automatically shifting the seat from its horizontal position to a predetermined raised position; I further provide a bumper member, in the form of the spring 24, which, while permitting the seat under the momentum of spring 19 or in response to an external force, to swing past its predetermined raised position, acts as a resilient stop to hold the seat normally out of contact with the back of the chair.

For silencing the action of the parts and in order to avoid lubrication, the springs 14 and 24 are wound upon suitable fibre sleeves 29' which are therefore interposed between the springs and the shaft 9 and the abutment members 17 and 27 are covered with suitable fibre material 30 which acts as a silencer.

Due to the fact that the stops 17 and 27 are fixedly mounted on the shaft 10 and due to the fact that the position of these stops determines the location of the predetermined raised position of the seat, it is apparent that by adjusting the stops, the location of that raised position of the seat may be placed at any point desired, within a wide range, simply by rotating the shaft 10. As before pointed out, this shaft 10 may readily be rotated by loosening the clamp nuts 11 and with the clamp nuts 11 loosened, pressure on the front edge of the seat will rotate the seat and the shaft to the desired point after which, upon the tightening of the clamp nuts, this new position of the seat will be its position of equilibrium.

It is to be noted that, while the operating springs engage the seat pan, they are not connected thereto. Therefore, if it is desired to dispense with the action of one of the springs or both, all that is necessary is to slide either of the springs laterally until its shorter end moves out of registry with the abutment 17 or 27, after which, of course, the shifted spring will be ineffective. By this arrangement if it is desired that the seat travel back into contact with the back of the chair, the spring 24 may be rendered ineffective. Likewise, if it is merely desired to provide a means whereby the seat may have to be raised by manual means and prevented from swinging too far back, the spring 14 may be rendered ineffective. At the same time, the spring 24 may still be operative to prevent the seat from being thrown back against the chair back.

Also, it is to be observed that the operation of the springs is such that the weight of the seat makes no difference in the effectiveness of the springs and the weight of the seat will not cause undue pendulous action. I prefer to provide spring 14 with a greater number of coils than the spring 24 so that its action will be somewhat slower. It is not desired that the seat snap into raised position too rapidly; at the same, it is desired that it be stopped in its raised position quickly.

I claim as my invention:

1. A chair construction comprising a frame having side standards, a seat pivoted between said standards, a spring having one end acting on said seat and the other end acting in one direction on an abutment mounted stationarily with respect to said frame and free to move relatively to said abutment in the opposite direction and biasing the seat toward the vertical position, and a second spring having one end acting on said seat in a direction opposite to that of the first spring and the other end in one direction on an abutment mounted stationarily with respect to said frame and free to move relatively to said abutment in the opposite direction and acting to bias said seat in an opposite direction when the seat swings beyond the limit of its vertical movement under the influence of said first-mentioned spring.

2. A chair structure comprising a frame having side standards, a seat pivoted between said standards, a spring having one end acting on the seat and the other end acting in one direction on an abutment mounted normally stationarily with respect to said frame and adjustable relatively thereto and free to move relatively to said abutment in the opposite direction and biasing said seat toward vertical position and a second spring having one end acting on said seat in a direction opposite to that of the first spring and the other end in one direction on an abutment stationarily and adjustably connected to said frame and free to move relatively to said abutment in the opposite direction and acting to bias said seat in an opposite direction when the seat swings beyond the limit of its vertical movement under the influence of said first-mentioned spring.

3. A chair construction comprising a frame having spaced side members, a seat adapted for pivotal movement between said side members and including a bottom portion having flanges extending at right angles thereto, said flanges having transversely aligned openings, pivot stud portions extending inwardly from said side members through said aligned openings, a pair of coiled springs surrounding the axis of said stud members and acting in opposite directions, each having laterally extending end portions, one of which engages the seat and the other engages in one direction an abutment mounted stationarily with respect to said side members and being free to move in the opposite direction relatively to said abutment, one of said coiled springs being tensioned to resiliently maintain the seat in a raised position and the other being tensioned to oppose the movement of the seat beyond its normally raised position.

4. A chair construction comprising a frame having spaced side members, a seat adapted for pivotal movement between said side members and including a bottom portion having flanges extending at right angles thereto, said flanges having transversely aligned openings, pivot stud portions extending inwardly from said side members through said aligned openings, a pair of coiled springs surrounding the axis of said stud portions, one of said springs acting in one direction only and the other of said springs acting in

the opposite direction only, abutment means normally stationarily mounted with respect to said side members and adjustable relative thereto, each of said springs having laterally extending end portions, one of which engages the seat and the other of which is movable, upon pivotal movement of said seat, into and out of engagement with said abutment means, one of said coiled springs being tensioned to resiliently maintain the seat in a raised position and the other being tensioned to resiliently oppose the movement of the seat beyond its normally raised position.

5. A chair construction comprising a frame having spaced side members, a seat adapted for pivotal movement between said side members and including a bottom member provided with upwardly extending flanges on diametrically opposite sides, said flanges having transversely aligned openings therein, a rod extending across said bottom member having its opposite ends projecting through the aligned openings and rotatably adjustably secured against movement in said side members, abutment members carried by said rod and rotatively adjustable therewith, a pair of coiled springs encircling said rod, each having laterally extending opposite end portions, one end portion of each of said springs engaging the bottom member and the other end portion of each of said springs being movable into and out of engagement with one of said abutment members, one of said springs being tensioned to resiliently maintain the seat in a raised position and the other being tensioned to resiliently oppose the movement of the seat beyond its normally raised position.

6. A chair construction comprising a frame having side standards, a seat adapted for pivotal movement between said side standards, a rod supported between and rotatively adjustable to said side standards, said seat being pivotally mounted on said rod, a pair of abutment members carried by said rod, a pair of coiled springs surrounding said rod, each having a laterally extending end portion engaging said seat, and each having an end portion loosely engageable with one of said abutment members, said first-mentioned end portions projecting in opposite directions from the axis of said rod.

7. A chair construction comprising a frame having spaced side members, a seat adapted for pivotal movement between said side members and including a bottom member provided with upwardly extended flanges on diametrically opposite sides, said flanges having transversely substantially aligned openings therein, a rod extending across said bottom member and having its opposite ends projecting through said aligned openings in said flanges and having its ends rotatively adjustably secured against movement in said side members, a pair of abutments spaced apart and extending parallel with said rod, a pair of coiled springs surrounding said rod, each having laterally extending opposite end portions, one of said end portions being adapted to bear on the bottom member of the seat and the other end portion being adapted to engage an abutment member in one direction while being free to move relatively to the abutment member in the opposite direction, the laterally extending end portions of said springs which bear on the bottom member of the seat extending in opposite directions, and the laterally extending portions adapted to engage said abutment members being extended in opposite directions.

8. A chair construction comprising two laterally spaced support elements, a rod supported by said elements adjacent its opposite ends and rotatively adjustable about its own axis with respect to said elements, means operable to secure said rod against rotational movement about its axis, a seat element mounted on said rod for oscillation with respect to said rod about said rod axis, abutment means fixedly carried by said rod, a coiled spring loosely sleeved on said rod and having an end portion projecting transversely away from the axis of said rod and into co-operative relation with said seat element, the opposite end portion of said spring projecting transversely away from the axis of said rod and into cooperative relation with said abutment means, and a second coiled spring loosely sleeved on said rod and having an end portion projecting transversely away from the axis of said rod and into cooperative relation with said seat element in a region on the opposite side of said rod axis from the region of cooperative relation of said first end of said first-named spring with said rod, the opposite end portion of said second spring projecting transversely away from the axis of said rod and into cooperative relation with said abutment means.

9. A chair construction comprising two laterally spaced support elements, a rod supported by said elements adjacent its opposite ends and rotatably adjustable about its own axis with respect to said elements, means operable to secure said rod against rotational movement about its axis, a seat element mounted on said rod for oscillation with respect to said rod about said rod axis, abutment means fixedly carried by said rod, a coiled spring loosely sleeved on said rod and having an end portion projecting transversely away from the axis of said rod and into cooperative relation with said seat element, the opposite end portion of said spring projecting transversely away from the axis of said rod and into cooperative relation with said abutment means, and a second coiled spring loosely sleeved on said rod and having an end portion projecting transversely away from the axis of said rod and into cooperative relation with said seat element in a region on the opposite side of said rod axis from the region of cooperative relation of said first end of said first-named spring with said rod, the opposite end portion of said second spring projecting transversely away from the axis of said rod and into cooperative relation with said abutment means, the said opposite end portions of said two springs being movable, with oscillatory movement of said seat, into and out of engagement with said abutment means.

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