Jan. 15, 1952 W. E. NORDMARK 2,582,599

SEAT MOUNTING FOR THEATER CHAIRS OR THE LIKE

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Fig. 1

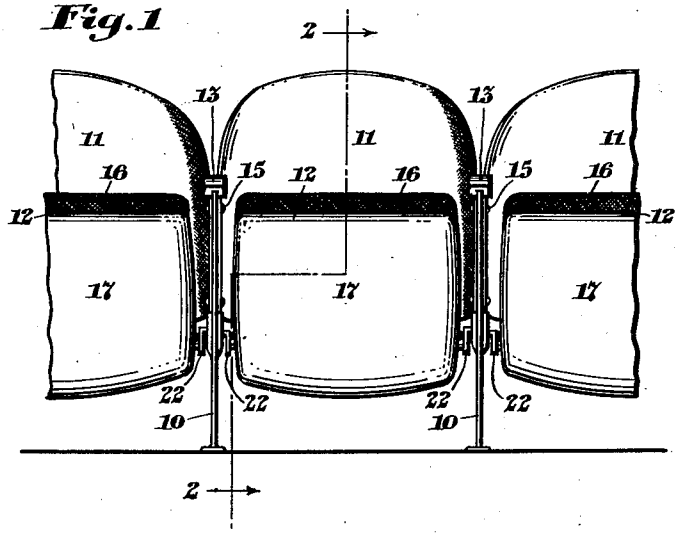


Fig. 2

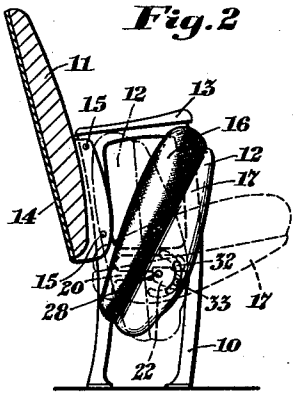
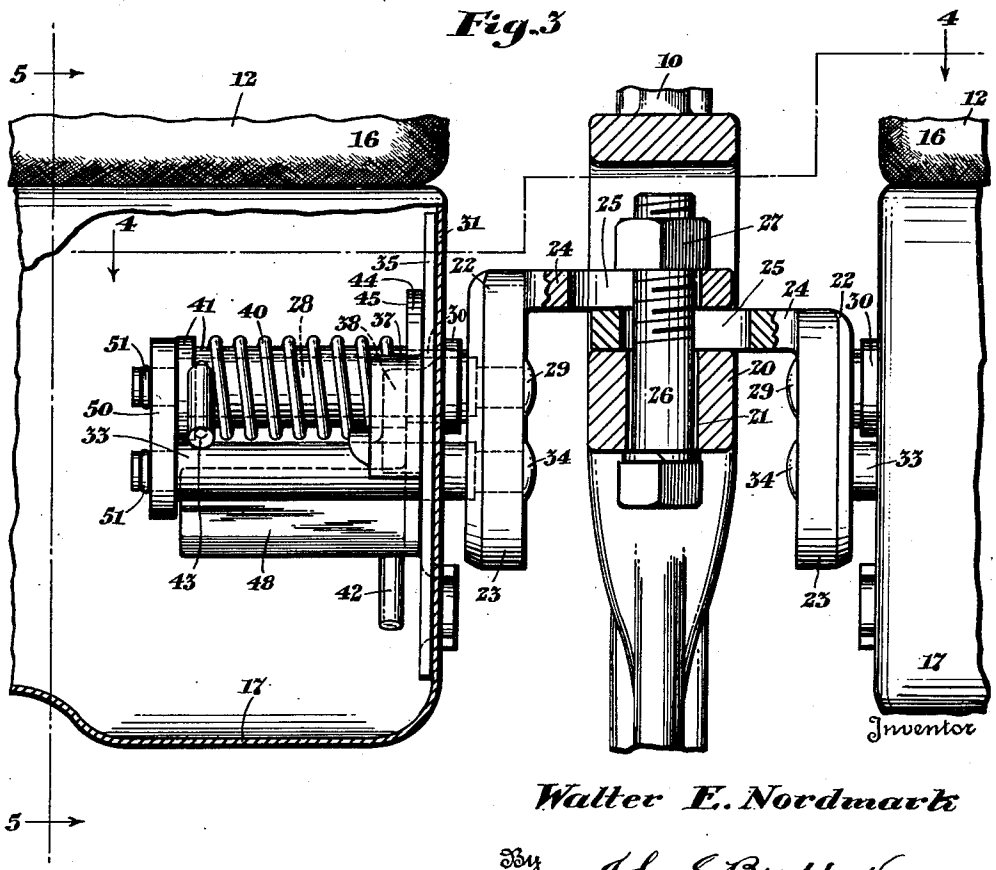


Fig. 3



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Fig. 4

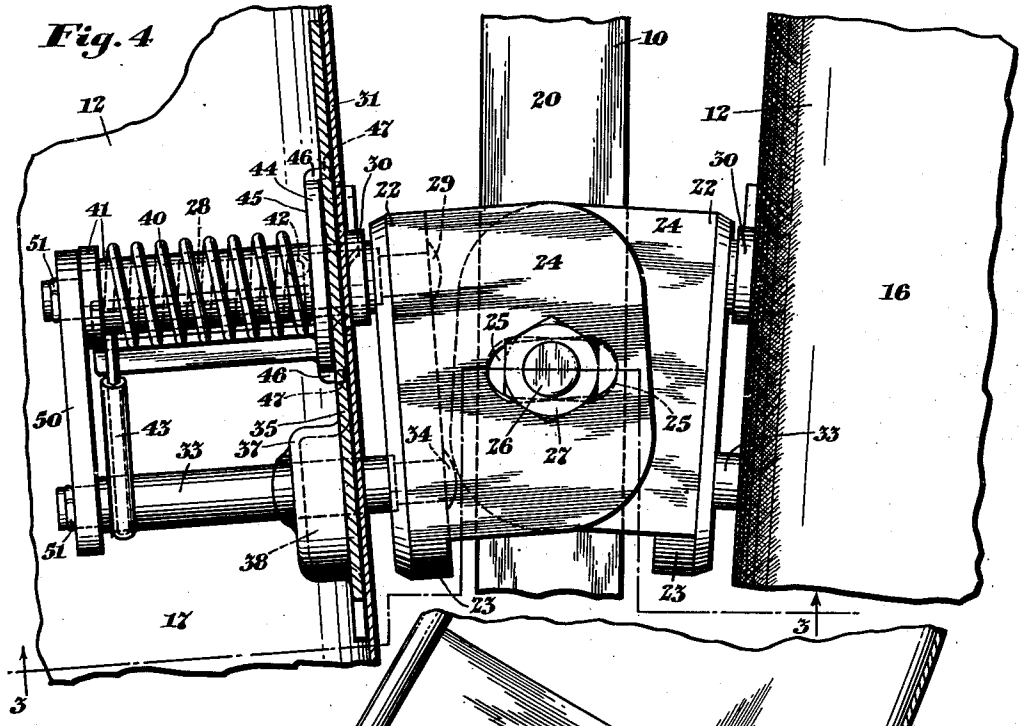
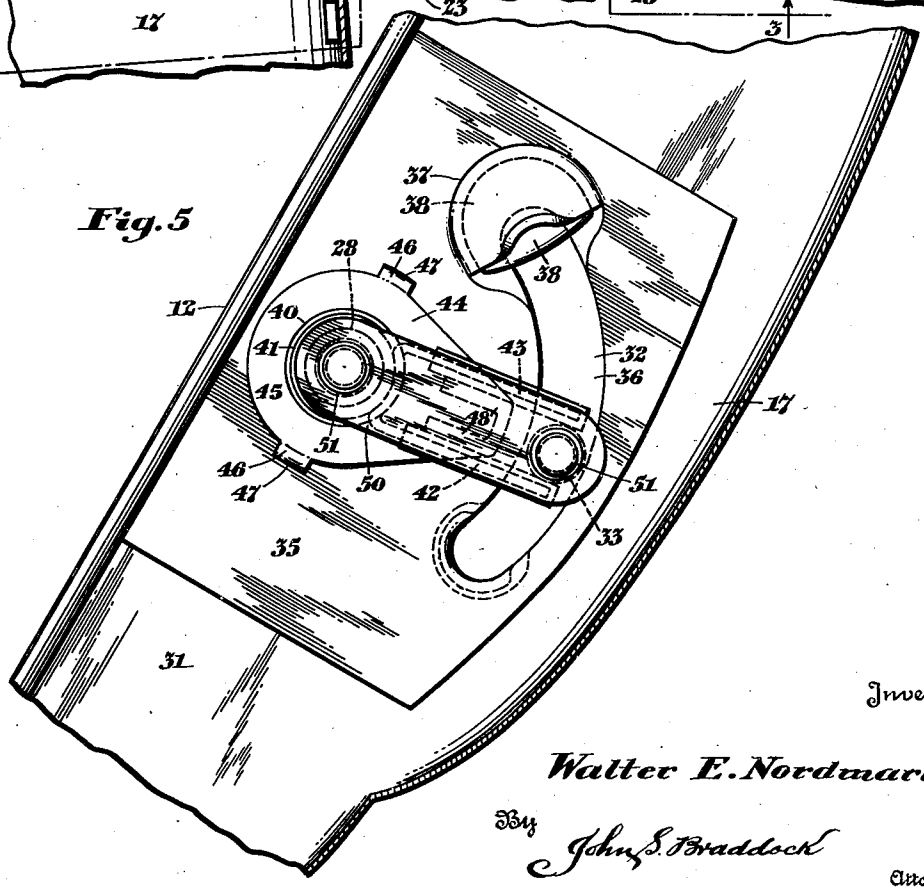


Fig. 5



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Fig. 6

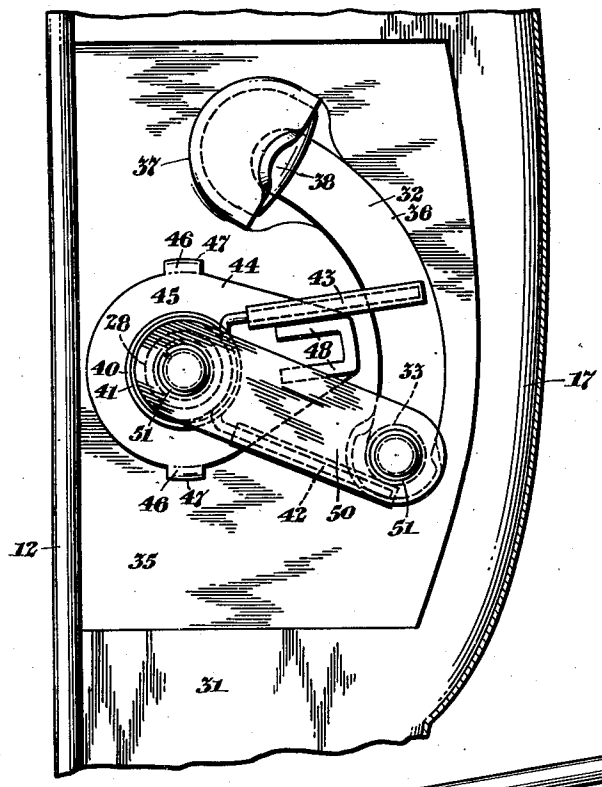
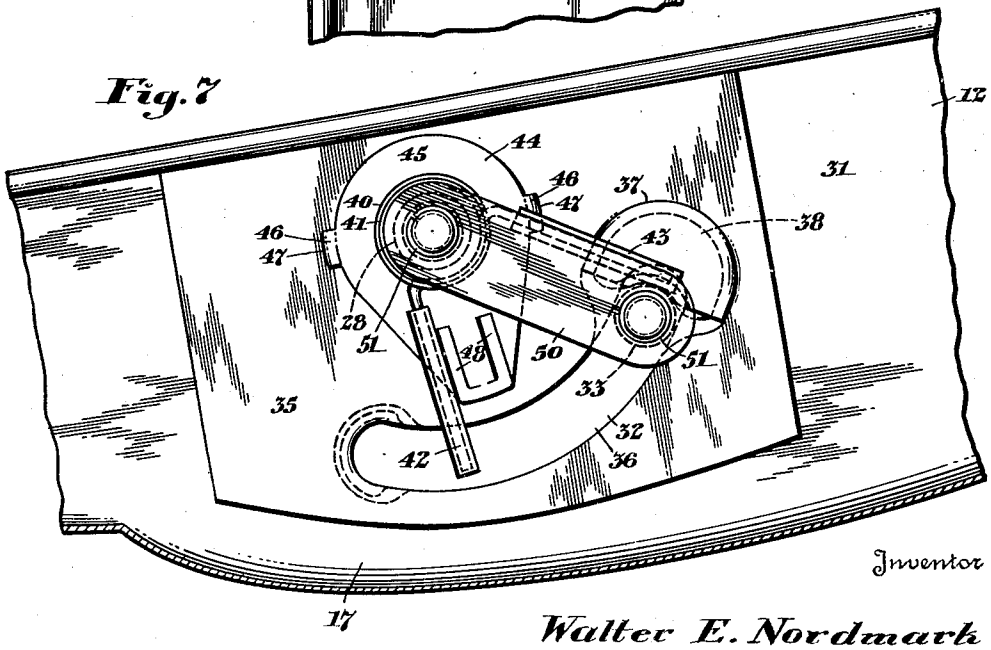


Fig. 7



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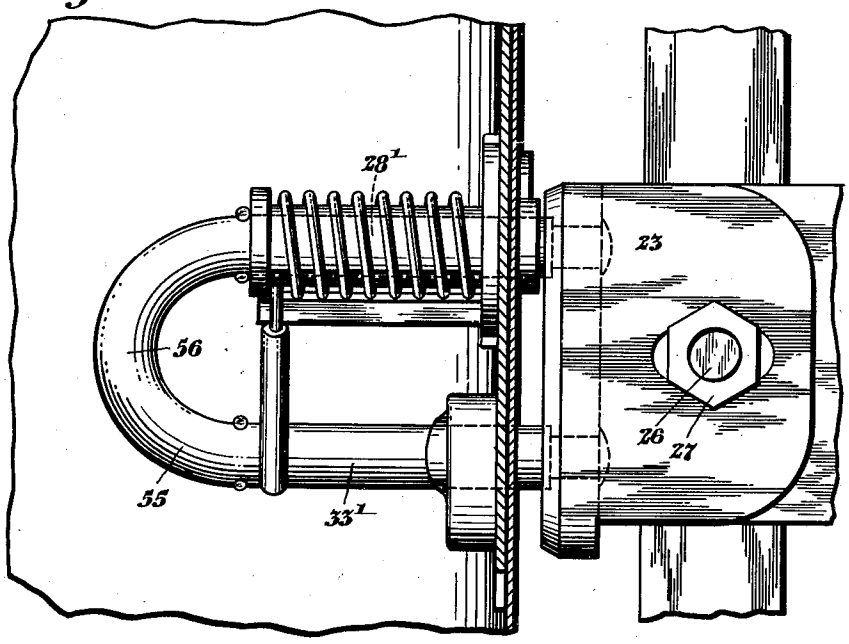
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SEAT MOUNTING FOR THEATER CHAIRS OR THE LIKE

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Fig. 8



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SEAT MOUNTING FOR THEATER CHAIRS OR THE LIKE

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Application August 6, 1947, Serial No. 766,500

9 Claims. (Cl. 155—86)

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The present invention relates to seat mountings and more particularly to the mountings for the seats of chairs adapted for installation in rows in theaters, auditoriums and the like.

The primary objects of the invention are to provide improved means for mounting seats of the theater type between spaced, upright, chair-supporting standards; to provide improved seat mounting for turnably connecting the seat to the standards so that it may be lowered to a nearly horizontal position for occupancy or raised to a nearly vertical position as when the occupant rises to permit others to pass in front of him; to provide such seat mountings whereby the seat is normally caused to assume an intermediate or neutral position between its fully raised and fully lowered positions, so that all of the seats in an unoccupied theater will normally automatically assume the same angular position and thus present a uniform and attractive appearance; to provide such seat mountings which are adaptable for use in either straight or curved rows of chairs, and which include compensating means for slight errors in the positions of the supporting standards; to provide novel stop means for positively stopping the raising and lowering movements of the seat at predetermined limits; to provide seat mountings the parts of which are economical to manufacture and assemble and which, when assembled in a chair structure, are readily accessible for replacement or repair; and in general to provide a chair structure which may readily be installed in a theater or the like, which is sturdy in construction and effective in use, and which is attractive in appearance.

Illustrative embodiments of the invention are shown in the accompanying drawings, wherein:

Figure 1 is a front elevational view of a chair of the theater type installed between supporting standards each of which also supports one side of an adjacent chair in a row thereof, the adjacent chairs being shown fragmentarily;

Figure 2 is a sectional view of the same taken on line 2—2 of Figure 1, the seat being shown in its normal, neutral position in full lines, in its lowered position for occupancy in dotted lines, and in its fully raised position in broken lines;

Figure 3 is an enlarged, fragmentary, vertical sectional view of a supporting standard, seats supported thereby, and the seat mountings by means of which the seats are connected to the standards, the section being taken on line 3—3 of Figure 4, and the seat being shown in its lowered position for occupancy;

Figure 4 is a fragmentary, horizontal sectional

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view of the same taken on line 4—4 of Figure 3, the showing here being of adjacent seats installed in a curved row;

Figure 5 is a fragmentary, sectional view through a seat foundation, taken on line 5—5 of Figure 3 and illustrating the seat's normal, neutral position intermediate its extreme lowered and raised positions;

Figure 6 is a view similar to Figure 5 illustrating the seat's extreme raised position;

Figure 7 is a view similar to Figures 5 and 6 illustrating the seat's extreme lowered position for occupancy; and

Figure 8 is a fragmentary, horizontal sectional view similar to Figure 4 but showing a modified form of the structure.

Referring now in detail to these drawings, a row of seating best illustrated in Figure 1 is mounted upon spaced, upright chair-supporting standards 10 which are pre-installed in a theater or the like and upon which are subsequently mounted chair backs 11 and chair seats 12. The standards 10 are of the type known as middle standards, each serving as a common support for the adjacent sides of adjoining chairs in a row and each being provided with a conventional arm rest 13. In the present construction, the chair backs 11 are shown mounted on back plates 14 which are secured in any conventional manner, as by bolts or rivets 15, to a pair of the standards 10.

Each chair seat 12 comprises a seat cushion 16 removably mounted in conventional manner upon a sheet metal seat foundation or "seat pan" 17, and the essence of the present invention resides in the seat mounting connections between the seat pan 17 and the supporting standards 10 whereby the following results are accomplished:

1. A support is provided for the weight of the seat and the occupant;

2. A pivot is provided about which the seat turns to raised and lowered positions;

3. The seat is normally maintained in a neutral position between its raised and lowered positions;

4. Stops are provided for the seat in its extreme raised and lowered positions;

5. Provision is made for ready installation of the seats on pre-installed standards in either straight or curved rows; and

6. Lateral or horizontal adjustment is made to compensate for slight errors in the spacings between standards.

The standards 10 are usually made of cast

metal, and each standard is provided with a horizontal web portion 20 having a vertical opening 21 therein. Seat brackets 22 comprise vertical mounting portions 23 and horizontal portions 24 with horizontally elongated vertical openings 25 therein. The seat brackets 22 for the adjacent sides of adjoining chairs (see Figure 3) are secured to their common supporting standard 10 as by means of a pin or bolt 26 inserted upwardly through the opening 21 in the standard's web portion 20 and through the openings 25 in a pair of seat brackets 22, a nut 27 being provided on the upper end of bolt 26 for securing the brackets to the standards, and the brackets being secured in required horizontally adjusted position and in required angularly adjusted position about the axis of the pin or bolt 26. It will be seen that the horizontal portions 24 of the left hand seat brackets 22 are at a slightly higher level than the horizontal portions of the right hand seat brackets 22, and that the vertical portions 23 of the left hand seat brackets 22 are slightly longer than the vertical portions of the right hand brackets. By this formation of the seat brackets the hereinafter described connections between the seat pans and the seat brackets are all at the same level.

Each seat pan 17 is turnably journalled on a pair of mutually inwardly extending annular trunnions 28 secured as by riveting at 29 to the vertical portions 23 of seat brackets 22 on an adjacent pair of standards 10. Preferably oilless bearings 30 are interposed between the trunnions 28 and the circular openings through the side walls 31 of the seat pan through which openings the trunnions 28 extend. The side walls 31 of the seat pan are also provided with arcuate openings or slots 32 concentric with the trunnions 28, through which slots pass mutually inwardly extending studs 33 riveted at 34 to the seat brackets 22 on said adjacent pair of standards 10. Reinforcing plates 35 secured as by welding to the inner surfaces of the seat pan's side walls 31, have similar arcuate slots 36 which register with the slots 32 in said side walls 31. These reinforcing plates also have inwardly pressed pockets 37 at the upper ends of the slots 36, into which pockets are inserted rubber cushion bumpers 38. It will be seen that when the seat is in its lowered position for occupancy (see Figure 7) the rubber cushion bumpers 38 rest on the studs 33, said studs thus serving as stops for the lowering movement of the chair seat and as supports for the seat when occupied. The studs 33 also engage the opposite ends of the slots 36 to limit the upward swinging movement of the seat from its neutral position shown in Figure 5 to its extreme raised position shown in Figure 6.

A coil spring 40 surrounds each trunnion 28, and an annular fiber bushing 41 is desirably interposed between said spring 40 and its trunnion 28. This coil spring 40 has an outer projecting end portion 42 which in the neutral position of the chair seat shown in Figure 5 bears against the underside of the stud 33, and an inner projecting end portion 43 which in said neutral position of the chair seat bears against the upperside of said stud 33. The projecting end portions 42 and 43 of the spring 40 are desirably rubber-sheathed as shown to insure quietness in the operation of the chair seat, and the spring 40 is wound prior to assembly so that these end portions 42 and 43 normally bear against the stud 33 as shown in Figure 5.

A member 44 has a vertical portion 45 surrounding the trunnion 28 and secured to the inner surface of the plate 35 as by means of lugs 46 welded in sockets 47 in said plate. The member 44 is formed to provide a cross-sectionally U-shaped horizontal arm 48 which extends inwardly between the projecting ends of the coil spring 40 and which arm 48 has a dimension in common with the diameter of the stud 33 so that when the seat is in its neutral position shown in Figure 5 the parallel projecting ends 42 and 43 of the coil spring 40 contact both the arm 48 and the stud 33. The arm 48 being thus normally confined between the spring's ends 42 and 43 and being rigidly connected to the seat pan 17, the seat is normally maintained at the predetermined angle illustrated in Figure 5, and all of the seats in a row are thus maintained at a uniform angle of inclination when unoccupied, notwithstanding differences in the amounts of compression on the coil springs 40.

When the seat is occupied and thus turned by the weight of the occupant from its position illustrated in Figure 5 to its position illustrated in Figure 7, the arm 48 carries the spring's inner end portion 42 downwardly out of engagement with the stud 33. Thereafter when the occupant rises from the seat, the spring's unwinding force exerted through its end 42 on the arm 48 returns the seat to its normal, neutral position. Similarly, when the occupant rises and presses the seat from its neutral position illustrated in Figure 5 to its extreme raised position illustrated in Figure 6, in order to permit other theater patrons to pass in front of him, the arm 48 carries the spring's outer end portion 43 upwardly out of engagement with the stud 33 and thereafter the spring's unwinding force exerted through its end 43 on the arm 48 returns the seat to its normal, neutral position.

In the embodiment of the invention shown in Figures 3–7 inclusive, the inner end of each trunnion 28 is connected to the inner end of the adjacent stud 33 by means of a tie-bar 50 fitted over the reduced ends of the trunnion and stud and removably secured in position by means of split rings 51 snapped into annular grooves in the trunnion and stud. The tie-bar 50 adds rigidity to the structure, and has the advantage that it can readily be removed to permit disassembly of the seat mountings for the repair or replacement of parts.

In the modification of the invention shown in Figure 8, the trunnion 28^1 and stud 33^1 are the legs of an integral U-shaped member 55, said legs being connected at their inner ends by the bight portion 56 of the U-shaped member. This construction also possesses rigidity and has the advantage that a unitary member provides both the trunnion and the stud elements of the structure.

In either of the constructions shown, the seat mountings, including the brackets 23, are preferably assembled to the seats at the factory and the trunnions 28 or 28^1 are prevented from withdrawal outwardly through the bearing openings and arcuate slots in the side walls of the seat pan by means of the tie-bars 50 of Figures 3–7 or the bight 56 of Figure 8. The installation comprises pre-installing the standards in a theater, and thereafter mounting the backs on the standards as shown, and mounting the seats on the standards in properly adjusted positions by the simple expedient of inserting the bolts 26 and applying the nuts 27 as hereinbefore described.

While but two specific embodiments of the invention have been herein shown and described, it will be understood that numerous details of the constructions shown may be altered or omitted without departing from the spirit of the invention as the same is defined by the following claims.

I claim:

1. In a chair structure: a pair of standards; a seat bracket mounted on each standard; trunnions on said brackets extending mutually inwardly; a seat having its opposite side walls journalled on said trunnions and one of said side walls having a slot therethrough; a stud on one of said brackets extending inwardly through said slot; and adapted to engage the ends of the slot for limiting swinging movements of the seat on the trunnions to positions wherein the seat is lowered for occupancy or raised for non-occupancy; a coil spring surrounding one of said trunnions and having projecting end portions normally pressing against said stud on opposite sides thereof; an arm on the seat extending inwardly between the projecting end portions of said coil spring and normally confined therebetween for maintaining the seat in a neutral position intermediate its lowered and raised positions, said spring's end portions being respectively yieldable to move with said arm during the respective manual raising and lowering movements of the seat and being respectively adapted to press against said arm on opposite sides thereof for returning the arm and the seat to their neutral positions.

2. In a chair structure: a pair of standards; a seat bracket mounted on each standard; trunnions on said brackets extending mutually inwardly; a seat having its opposite side walls journalled on said trunnions and said side walls having aligned arcuate slots concentric with said trunnions; studs on said brackets extending mutually inwardly through said slots and adapted to engage the ends of the slots for limiting swinging movements of the seat on the trunnions to positions wherein the seat is lowered for occupancy or raised for non-occupancy; coil springs surrounding said trunnions each having projecting end portions normally pressing against the adjacent stud on opposite sides thereof; arms on the seat extending inwardly between the projecting end portions of said coil springs respectively and normally confined therebetween for maintaining the seat in a neutral position intermediate its lowered and raised positions, each spring's end portions being respectively yieldable to move with the adjacent arm during the respective manual raising and lowering movements of the seat and being respectively adapted to press against said arm on opposite sides thereof for returning the arm and the seat to their neutral positions.

3. In a chair structure: a pair of standards; a seat bracket mounted on each standard; trunnions on said brackets extending mutually inwardly; a seat having its opposite side walls journalled on said trunnions and one of said side walls having a slot therethrough; a stud on one of said brackets extending inwardly through said slot; and adapted to engage the ends of the slot for limiting swinging movements of the seat on the trunnions to positions wherein the seat is lowered for occupancy or raised for non-occupancy; a coil spring surrounding one of said trunnions and having projecting end portions normally pressing against said stud on opposite sides thereof; an arm on the seat extending inwardly between the projecting end portions of said coil spring and normally confined therebetween for maintaining the seat in a neutral position intermediate its lowered and raised positions, said spring's end portions being respectively yieldable to move with said arm during the respective manual raising and lowering movements of the seat and being respectively adapted to press against said arm on opposite sides thereof for returning the arm and the seat to their neutral positions, said stud and said arm having a common dimension such that when the seat is in its neutral position the spring's parallel end portions are in contact with the opposite sides of both the stud and the arm respectively.

4. In a chair structure: a pair of standards having horizontal web portions with vertical openings therein; seat brackets having horizontal portions with vertical openings therein; fastening means passing vertically through the opening in each standard's web portion and through the opening in a seat bracket for securing a bracket to each standard; trunnions on said seat brackets extending mutually inwardly; a seat comprising a seat cushion mounted upon an enclosed seat pan, said pan having its opposite side walls journalled on said trunnions and said side walls having aligned arcuate slots concentric with said trunnions; studs on said brackets extending mutually inwardly through said slots and adapted to engage the ends of the slots for limiting swinging movements of the seat on the trunnions to positions wherein the seat is lowered for occupancy or raised for non-occupancy; spring means disposed within the seat pan and interconnecting the seat and a stud for normally urging the seat upwardly from its lowered position and downwardly from its raised position so that the normal position of said seat is intermediate said lowered and raised positions.

5. In a chair structure: a pair of standards having horizontal web portions with vertical openings therein; seat brackets having horizontal portions with vertical openings therein; fastening means passing vertically through the opening in each standard's web portion and through the opening in a seat bracket for securing a bracket to each standard; trunnions on said seat brackets extending mutually inwardly; a seat having its opposite side walls journalled on said trunnions and said side walls having aligned arcuate slots concentric with said trunnions; studs on said brackets extending mutually inwardly through said slots and adapted to engage the ends of the slots for limiting swinging movements of the seat on the trunnions to positions wherein the seat is lowered for occupancy or raised for non-occupancy; coil spring surrounding said trunnions each having projecting end portions normally pressing against the adjacent stud on opposite sides thereof; arms on the seat extending inwardly between the projecting end portions of said coil springs respectively and normally confined therebetween for maintaining the seat in a neutral position intermediate its lowered and raised positions, each spring's end portions being respectively yieldable to move with the adjacent arm.

6. In a chair structure: a pair of standards; a seat comprising a seat pan having upstanding side walls provided with horizontally aligned circular bearing openings and arcuate slots therethrough concentric with said openings; trun-

nions extending from the exterior of the pan mutually inwardly through said bearing openings and providing horizontally aligned bearings upon which the seat is journalled for turning movement; studs extending from the exterior of the pan mutually inwardly through said arcuate slots; means preventing withdrawal of the trunnions and the studs outwardly through the bearing openings and the arcuate slots; seat brackets at opposite sides of the seat pan to which brackets the outer ends of the trunnions and studs are rigidly connected, said seat brackets being adapted for removable attachment to the standards respectively; and said studs being adapted to engage the ends of the arcuate slots for limiting turning movements of the seat on the trunnions to positions wherein the seat is lowered for occupancy or raised for non-occupancy.

7. In a chair structure: a pair of standards; a seat comprising a seat pan having upstanding side walls provided with horizontally aligned circular bearing openings and arcuate slots therethrough concentric with said openings; trunnions extending from the exterior of the pan mutually inwardly through said bearing openings and providing horizontally aligned bearings upon which the seat is journalled for turning movement; studs extending from the exterior of the pan mutually inwardly through said arcuate slots; means preventing withdrawal of the trunnions and the studs outwardly through the bearing openings and the arcuate slots; seat brackets at opposite sides of the seat pan to which brackets the outer ends of the trunnions and studs are rigidly connected, said seat brackets being adapted for removable attachment to the standards respectively; and said studs being adapted to engage the ends of the arcuate slots for limiting turning movements of the seat on the trunnions to positions wherein the seat is lowered for occupancy or raised for non-occupancy; and spring means for normally urging the seat upwardly from its lowered position.

8. A structure according to claim 2 characterized by a tie-bar connecting the inner end of each trunnion with the inner end of the adjacent stud.

9. A structure according to claim 2 characterized by having each trunnion and the adjacent stud constituted by the legs of a U-shaped member the inner bight portion of which connects said trunnion and said stud and the leg extremities of which are secured to the adjacent seat bracket.

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