May 30, 1950 S. B. McDONALD 2,509,739

THEATER CHAIR

Filed Nov. 17, 1944 2 Sheets-Sheet 1

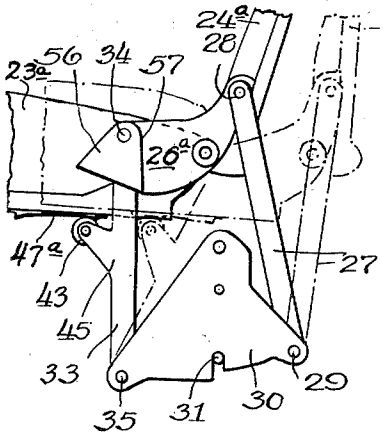


Fig. 6

Fig. 1

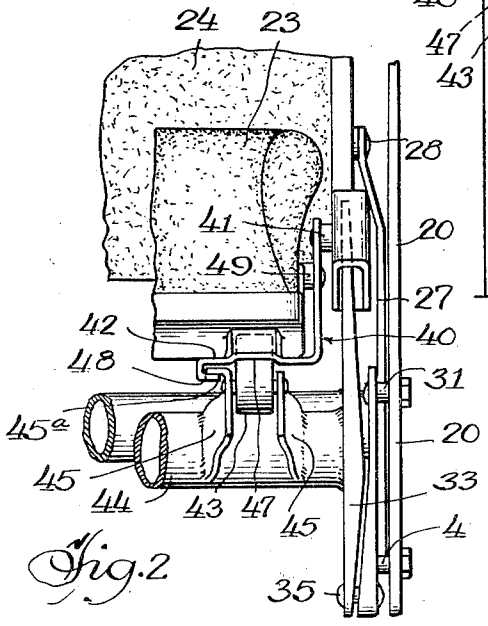


Fig. 2

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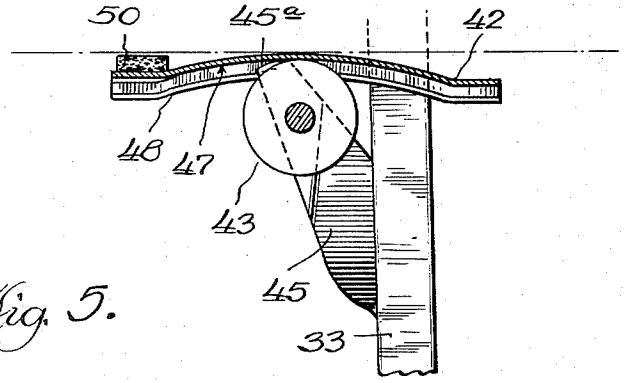


Fig. 5.

Fig. 4.

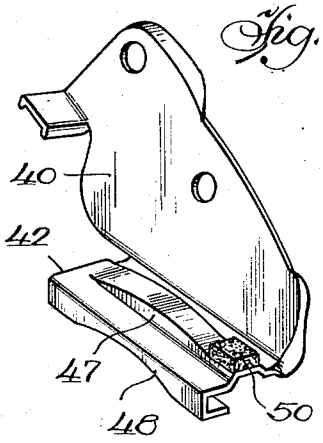
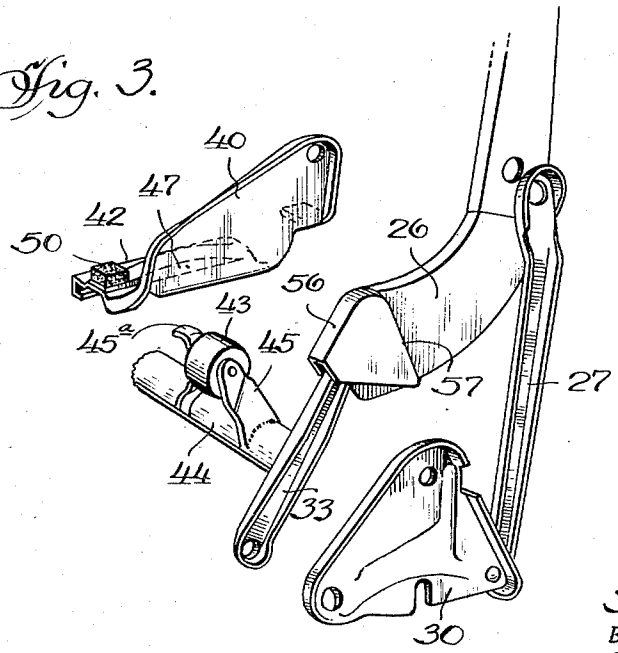


Fig. 3.



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THEATER CHAIR

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Application November 17, 1944, Serial No. 563,836

6 Claims. (Cl. 155—116)

1

This invention relates to improvements in theatre chairs of the type affording retractive movement of the seat and back when necessary to facilitate the passage of a person in front of the occupant.

One of the difficulties commonly encountered with chairs of the character above described is that of controlling the forward and backward shifting action of the seat and back, especially when the occupant is seated therein, so as to minimize the abrupt shocks which commonly occur at the limits of shifting movement. Such shocks are not only disturbing to the occupant, but are detrimental to the life of the chair structure.

The principal object of the present invention is to overcome the difficulty above described by providing a controlled balanced action of the movable supporting members whereby the seat may be moved smoothly through its various positions of adjustment, and with slightly increasing resistance toward the opposite limits of its movement so as to eliminate the abrupt shocks previously common in chairs of this kind. Other objects of the invention will appear from time to time as the following description proceeds.

The invention may best be understood by reference to the accompanying drawings in which:

Figure 1 is a side view of a chair constructed in accordance with my invention, with one of the side pedestals removed to disclose details of the seat assembly and its supporting levers, and showing the seat and back in full lines in the normal seating position, and in dotted lines in the retracted position.

Figure 2 is a fragmentary front view of the parts shown in Figure 1.

Figure 3 is a composite perspective view of the several parts of the lever supporting members for the back and seat, with the members in detached, or exploded relation to each other.

Figure 4 is an enlarged detail perspective of a curved track element forming one of the parts shown in the preceding figures.

Figure 5 is an enlarged section taken longitudinally of the track element shown in Figure 4; and

Figure 6 is a side view showing a modified form of my invention, in which the curved track member is carried directly on the bottom of the folding seat, instead of on a subframe member.

Referring now to details of the embodiment of the invention illustrated in the drawings, the form shown in Figures 1 to 5 inclusive comprises a theatre chair of the kind broadly disclosed in

2

my application bearing Serial No. 537,225 filed May 25, 1944, now Patent No. 2,430,356 granted Nov. 4, 1947. In this form of chair, 20, 20 indicates the side pedestals on which the chair is mounted. Two of such pedestals are required for each chair, but when arranged in a row a single pedestal between adjacent chairs serves for both.

A seat and back assembly is mounted between a pair of pedestals 20, 20 and consists generally of a seat 23 and back 24 having rocking supporting means permitting limited forward and rearward movement in a substantially horizontal direction relative to the pedestals. The back 24 has a pair of side plates 26, 26 rigidly connected thereto and projecting forwardly in a generally horizontal direction from adjacent the bottom thereof. A pair of supporting levers or links 27, 27 commonly termed "main levers," are connected to opposite sides of the back on pivots 28, 28 disposed slightly above the bottom edge thereof. Said main levers extend downwardly of the back to pivotal supports 29, 29 suitably supported on the inner faces of the proximate pedestals 20. In the form shown herein the pedestal supports 29, 29 form part of triangular-shaped mounting frames 30, 30 which are detachably mounted on the pedestals 20 by a plurality of bolts 31, 31.

The forward ends of the side plates 26, 26 of the back have a second pair of supporting levers 33, 33 connected thereto on pivots 34, 34, said last-named levers, commonly termed "sublevers," overlie said side plates and extend downwardly therefrom to pivots 35, 35 on the front ends of the mounting frames 30, 30 respectively.

The seat and back assembly is also supported for horizontal sliding movement relative to the sub-levers 33. In the form shown herein said assembly includes a pair of subframes 40, 40, to which the seat 23 is pivotally supported at 49, 49. Each of said sub-frames has its rear end pivotally connected at 41 to the inner face of a proximate side plate 26 adjacent the lower edge of the back 24. Said sub-frames extend forwardly and downwardly between the side plates 26 and are formed with inwardly extending flanged portions 42, 42 adjacent their forward ends. The front portion of the pivoted seat 23 is supported in its horizontal seating position upon the upper surfaces of the flanged portions 42, 42 of the sub-frames 40, 40, as by resilient pads 50.

The horizontally extending flanges 42, 42 of the subframes 40 are each provided with longitudinally extending, arcuately formed tracks 47, 47 on their under surface, having rolling engage-

ment with laterally spaced rollers 43, 43 mounted on a cross bar 44 rigidly connected with sub-levers 33, 33 intermediate their ends. In the form shown each of the rollers 43 is rotatably mounted between a pair of wings 45, 45 suitably secured to said cross bar.

The flanges 42, 42 of subframes 40 are also provided with inturned longitudinal guide members 48 arcuately curved to correspond with the track members 47, for sliding engagement with out-turned lugs 45a on the upper end of the inner wings 45 (see Figure 2).

From the above description of the supporting linkage the sliding roller support for the seat assembly, it will be observed that due to the fixed pivotal mounting of the sub-levers 33 at their bottom ends, the rollers 43 normally swing so as to describe arcuate paths which are slightly higher at their intermediate points than in fully extended and retracted positions of the seat and back assembly. Similarly, the pivot points 34 between the main lever 27 and the side plates 26 swing in arcuate paths, but on a slightly longer radius. As a result, the forward and backward shifting movement of the seat and back assembly would normally tend to be accelerated by gravity as it approaches its forwardmost and rearwardmost positions.

In order to overcome this objectionable tendency it will be observed that the portions of the tracks 47, 47 which are slidably engaged by the rollers 43, 43 are each curved substantially on a substantially continuous arc, having its center below said track, and of greater radius than the radius of rocking movement of its respective roller about its pivot 35. This not only compensates for, or counteracts, the swinging movement of the rollers 43 on their levers 33, to prevent any drop of the seat as it moves toward its fully extended or retracted positions, but also causes a gradual rise of the seat as it approaches the limit of its shifting movement in both directions thus retarding the shifting movement as the seat approaches both limits. In addition, the front ends of said tracks are curved in a slightly more abrupt arc than their rear ends so as to produce a somewhat greater retardation when the seat asembly is pushed rearwardly, than when it is pushed forwardly. This arrangement is particularly advantgeous in a chair of this character since the occupant is usually able to exert more power in pushing the seat rearwardly toward its retracted position when seated than in pulling it forwardly towards its extended, normally seating position.

Means for positively limiting the forward and rearward shifting movement of the back and seat assembly, may also be provided, as shown herein, such means consisting of a pair of downwardly diverging wing portions 56 and 57, suitably fixed to each side plate 26 forwardly and rearwardly of the pivotal connection 34 of the proximate sub-lever 33, and carrying resilient bumpers 58 and 59 respectively, which serve as stops for both sub-levers to limit the forward and rearward shifting movement of the back and seat.

In the modified form of chair shown in Figure 6, the back and seat assembly consists of a seat 23a pivoted directly to the side plates 26a of the back 24a, so that no subframe corresponding to the part 40 in the previously described form of chair is employed. Instead, the supporting rollers 43 have rolling engagement with arcuate tracks 47a, 47a carried directly on the under surface of the seat 23a. The function of the arcuate tracks 47a, 47a however, is the same as that heretofore described for the tracks 47, 47 in the form of chair shown in Figures 1 to 5, inclusive.

It will now be understood that the arcuate tracks 47, 47 and 47a, 47a comprise in effect cam means which cooperate with the supporting rollers 43 to cause the shifting movement of the seat in a generally horizontal level path but as the seat is moved from its midway position toward either of its extreme limits of forward and rearward movement, it is caused to rise gradually, especially as it moves toward its rearmost, fully retracted position. It will further be understood that the tracks or cam devices 47, or 47a and their supporting rollers 43 may be interposed in any suitable manner between the sublevers 33 and any forwardly projecting portion of the seat and back assembly which it is desired to support for sliding movement, in order to produce the same result. Therefore, I do not wish to be understood as limiting myself to the specific form and arrangement of parts described and shown herein, excepting as may be specifically defined in the appended claims.

I claim:

1. In a chair, opposed supports therefor, a back, side members fixed to the back, sub-frame members pivotedly connected to said side members, a seat pivotedly connected to said sub-frame members, front and rear levers pivoted at their upper ends to said side members and at their lower ends to said supports, said front levers having supporting means intermediate their ends, said sub-frame members having a cam track on the front end thereof having slidable engagement with said supporting means on said front levers, said cam track being arcuately shaped to prevent any substantial drop of the sub-frame members as the back and seat near their fully extended and retracted position.

2. In a chair, opposed supports therefor, a back, side members fixed to the back, sub-frame members pivotedly connected to said side members, a seat pivotedly connected to said sub-frame members, front and rear levers pivoted at their upper ends to said side members, and at their lowers ends to said supports, said front levers having supporting means intermediate their ends, said sub-frame member having a cam track on the front end thereof having slidable engagement with said supporting means on said front levers, said cam track being arcuately shaped to prevent any substantial drop of the sub-frame member as the back and seat near their fully retracted position.

3. In a chair, opposed supports therefor, a back, side members fixed to the back, sub-frame members pivotedly connected to said side members, a seat pivotedly connected to said sub-frame members, front and rear levers pivoted at their upper ends to said side member and at their lower ends to said supports, said front levers having supporting means intermediate their ends, said sub-frame member having a cam track on the front end thereof having slidable engagement with said supporting means on said front levers, said cam track being arcuately shaped to cause the sub-frame members to rise against gravity as they approach their forwardmost and rearwardmost limits of shifting movement.

4. In a retractable chair, a pair of laterally spaced pedestals, a seat assembly, supporting means for said assembly including longitudinally spaced generally upright levers pivotally supported on said pedestal at their lower ends and pivotally connected to said assembly at their up-

per ends, means for limiting the forward and rearward rocking movement of said levers relative to said pedestals, a sliding support member on the forwardmost lever intermediate the ends of the latter, and an arched cam track on the bottom of said seat assembly engaged by said sliding support member, the portion of said track engaged by said sliding support member being curved substantially continuously throughout its length on an arc having its center below said track and of greater radius than the radius of rocking movement of said support member about its pivot, to counteract the relative drop of said seat assembly due to the rocking movement of said forwardmost lever.

5. In a retractable chair, a pair of laterally spaced pedestals, a seat assembly, supporting means for said assembly including longitudinally spaced generally upright levers pivotally supported on said pedestal at their lower ends and pivotally connected to said assembly at their upper ends, means for limiting the forward and rearward rocking movement of said levers relative to said pedestals, a sliding support member on the forwardmost lever intermediate the ends of the latter, and an arched cam track on the bottom of said seat assembly engaged by said sliding support member, the portion of said track engaged by said sliding support member being curved substantially continuously throughout its length on an arc having its center below said track and of greater radius than the radius of rocking movement of said support member about its pivot, to counteract the relative drop of said seat assembly due to the rocking movement of said forwardmost lever, and the curvature of said track being sufficient to cause a gradual rise of said assembly as it approaches its fully extended and retracted positions.

6. In a retractable chair, a pair of laterally spaced pedestals, a seat assembly, supporting means for said assembly including longitudinally spaced generally upright levers pivotally supported on said pedestal at their lower ends and pivotally connected to said assembly at their upper ends, means for limiting the forward and rearward rocking movement of said levers relative to said pedestals, a sliding support member on the forwardmost lever intermediate the ends of the latter which support member normally rocks in an arcuate path extending forwardly and rearwardly of its dead center position relative to the lower pivotal support of said forwardmost lever, and an arched cam track on the bottom of said seat assembly engaged by said sliding support member the portion of said track engaged by said sliding support member being curved substantially throughout its length on an arc having its center below said track and of greater radius than the radius of rocking movement of said support member about its pivot, to counteract the relative drop of said seat due to the rocking movement of said support member as said seat nears its fully extended and retracted positions.

STERLING B. McDONALD.

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