

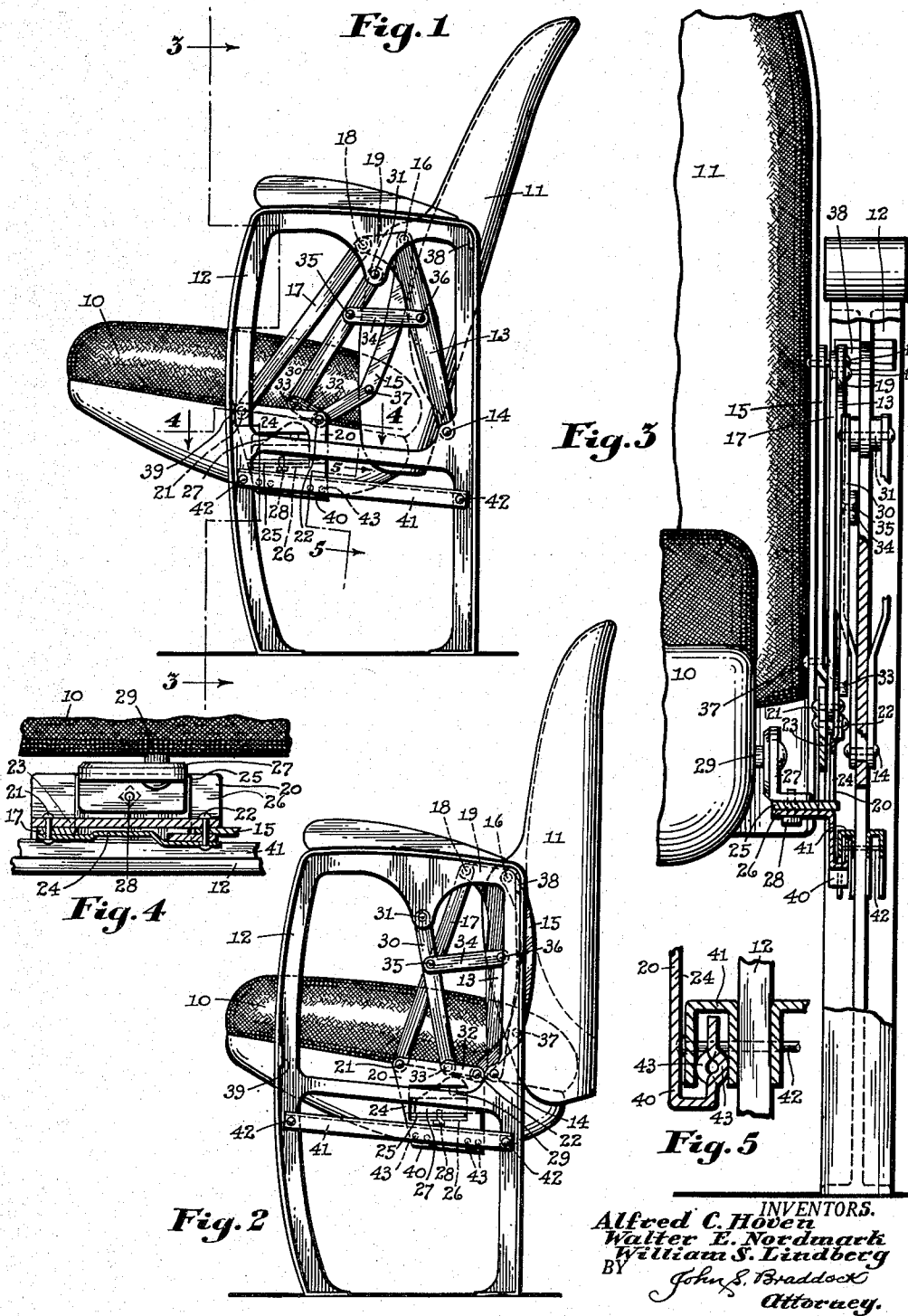
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RETRACTING TYPE THEATER CHAIR

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## RETRACTING TYPE THEATER CHAIR

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9 Claims. (Cl. 155—116)

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The present invention relates to theater chairs and more particularly to theater chairs of the retracting type. This application is a division from our co-pending application Serial No. 784,182 filed November 5, 1947, now matured into Patent No. 2,506,151, issued May 2, 1950, which latter application is a continuation-in-part of our application Serial No. 767,992 filed August 11, 1947, also co-pending, which issued on November 7, 1950, as Patent No. 2,529,451.

The primary objects of the invention are to provide a chair structure of the retracting type for use in theaters or the like, in which chair a mechanical linkage as described and claimed in our co-pending application Serial No. 784,182 is employed as a means for mounting the chair seat and back on a supporting frame for movements to a forward position for normal occupancy and to a rearwardly retracted position for facilitating passage of other theater patrons in front of the chair occupant; to provide such a chair in which the chair seat is mounted in such a manner that the seat is movable rearwardly-downwardly and forwardly-upwardly in an approximately straight path and is maintained at substantially the same angle of forward-upward inclination during such movements; to provide such a chair in which the back is movable rearwardly and forwardly with the seat and is angularly tilted during such movements so that when in its forward position the back is rearwardly-upwardly inclined and when in its rearward position said back is substantially vertical; and in general to provide a retracting type theater chair which is comfortable, quiet and smooth in operation and attractive in appearance.

These and any other and more specific objects hereinafter appearing are attained by, and the invention finds preferable embodiment in, the structure hereinafter particularly described and illustrated in the accompanying drawings, wherein:

Figure 1 is a side elevational view of a theater or auditorium chair of the retracting type, the chair being here shown with the seat and back thereof in their forward or unretracted positions;

Figure 2 is a side elevational view of the chair shown in Figure 1, the chair being here shown with the seat and back thereof in their rearward, retracted positions;

Figure 3 is an enlarged, fragmentary, front elevational view of the chair, shown partly in vertical section taken on line 3—3 of Figure 1;

Figure 4 is an enlarged, fragmentary, horizontal sectional view of parts of the chair, taken on line 4—4 of Figure 1; and

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Figure 5 is an enlarged, fragmentary, vertical sectional view of other parts of the chair, taken on line 5—5 of Figure 1.

Referring now in detail to this drawing, the retracting type theater chair there shown generally comprises a chair seat 10 and a chair back 11 interconnected as hereinafter fully described to form a seat and back assembly mounted on standards 12 which form the fixed supporting frame for the chair. The mountings at opposite sides of the chair are substantially identical and embody the mechanical linkage which is described in detail and claimed in our co-pending application Serial No. 784,182 filed November 5, 1947. The mountings comprise upstanding links 13 having their lower ends pivotally connected at 14 to the standards 12 near the rear of the standards and at the approximate level of the chair seat. Rear supporting links 15 have their upper ends pivotally connected at 16 to the upper ends of the upstanding links 13 and depend therefrom. Front supporting links 17 have their upper ends pivotally connected at 18 to upper forward extensions 19 on the upstanding links 13 and likewise depend therefrom. Seat carriers generally designated 20 have their forward ends pivotally connected at 21 to the lower ends of the front supporting links 17 and have their rearward ends pivotally connected at 22 to the lower ends of the rear supporting links 15.

The seat carriers 20 comprise spaced apart inner and outer plates designated 23 and 24 respectively which form spaced bearings for the pivots 21 and 22. These plates 23 and 24 have inwardly extending horizontal flanges 25 and 26 respectively which are secured together and to brackets 27 by means of machine screws 28 extending through apertures in the plates and threaded in the brackets. The chair seat 10 is pivotally mounted at 29 on and between the brackets 27 at opposite sides of the chair.

Depending links 30 have their upper ends pivotally connected at 31 to the standards near the upper middles of the standards above the level of the chair seat. Guide links 32 have their forward ends pivotally connected at 33 to the lower ends of the depending links 30 and have their rearward ends pivotally connected at 22 to the pivotal connections between the rear supporting links 15 and the seat carriers 20.

The upstanding link 13 and depending link 30 at each side of the chair are interconnected by means of a connecting link 34 having its forward end pivotally connected at 35 to a depending link 30 and having its rearward end pivotally con-

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nected at 36 to the adjacent upstanding link 13. These connections are such that the ratio of each depending link's entire length to that portion thereof which lies between its pivotal connections at 35 and 31 to the connecting link and the standard respectively is approximately double the ratio of each upstanding link's entire length to that portion thereof which lies between its pivotal connections 36 and 14 to the connecting link and the standard. As a result of this relationship, which is described in more detail in our co-pending application above referred to, the seat moves forwardly and rearwardly in a substantially straight, rearwardly-downwardly inclined path and during such movement the seat is maintained at substantially the same predetermined angle of inclination.

The chair back 11 is mounted on and between the rear supporting links 15 and is movable therewith, being secured thereto at the pivotal connections 16 between the rear supporting links 15 and the upstanding links 13, and also being secured thereto by means of rivets 37. It will be seen that when the seat moves rearwardly the back also moves rearwardly and tilts from its rearwardly-upwardly inclined position shown in Figure 1 to its substantially vertical position shown in Figure 2.

Rearward movement of the seat and the back is stopped by contact of the upper ends of the links 13 with stops 38 on the standards 12, while forward movement of the seat and the back is stopped by contact of the seat carriers with stops 39 on the standards. It will be apparent that many other means for stopping these forward and rearward movements might be contrived and such means, or the stops 38 and 39 shown, may if desired be equipped with cushioning and silencing rubber bumpers (not shown). Also not shown in the drawings is means for shielding the linkage from the chair occupant, but a convenient method of accomplishing this is to extend the side portions of the sheet metal back forwardly and flange them outwardly to form housings for the mechanisms.

The retracting chair described above is especially well adapted for installation in either straight rows of chairs or in curved rows wherein the common supports for adjoining chairs, or "middle standards" as they are called, converge slightly inwardly toward the front, the long links 13, 15, 30 and 17 providing the necessary flexibility for such installation in curved rows. This flexibility is also useful in compensating for inaccuracies in the placement of the standards. In order to prevent undesirable side play in the seat and back, there is preferably provided a guide at one side or if desired at both sides of the chair. The guide shown comprises an extension 40 on the seat carriers plate 24 (see Fig. 5) which projects downwardly, then outwardly, and then upwardly into an inverted U-shaped channel or guideway 41 secured to the adjacent standard 12 at the front and rear as by rivets 42. The portion of the seat carrier's extension 40 which extends upwardly into the guideway 41 may desirably have oppositely stamped semi-spherical embossings 43 (see Fig. 5) which insure a smooth bearing of the guide against the side walls of the guideway 41 with a minimum of friction, and a lubricant may if desired be applied to the inside of the guideway. It will be particularly noted that the guide and guideway here described bear none of the weight of the chair or the occupant thereof, but serve as guides alone. The weight of the chair seat and back

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and of the occupant thereof are supported entirely by the mechanical linkage mounted on the standards and hereinbefore described.

It will thus be seen that a theater chair of the retracting type is provided which is smooth in operation, flexible to meet varying conditions of installations, sturdy in construction and attractive in appearance. While but one specific embodiment of the invention has been herein shown and described, it will be understood that numerous details may be altered or omitted without departing from the spirit of the invention as the same is defined by the following claims.

We claim:

1. In a chair, a frame, a seat and back assembly, upstanding links having their lower ends pivotally connected to the frame and their upper ends pivotally connected to the seat and back assembly, depending links having their upper ends pivotally connected to the frame forwardly of the upstanding links and having their lower ends connected to the seat and back assembly, connecting links connecting the upstanding links to the depending links intermediate their upper and lower ends, and stop means for limiting the forward and rearward movements of the seat and back assembly.

2. In a chair, a frame, a seat and back assembly in which the seat and back are pivotally connected for interrelative movement, upstanding links having their lower ends pivotally connected to the frame and their upper ends pivotally connected to the back, depending links having their upper ends pivotally connected to the frame forwardly of the upstanding links and having their lower ends pivotally connected to the seat, connecting links connecting the upstanding links to the depending links intermediate their upper and lower ends, and stop means for limiting the forward and rearward movements of the seat and back assembly.

3. In a chair, a frame, a seat and back assembly in which the seat and back are pivotally connected for interrelative movement, upstanding links having their lower ends pivotally connected to the frame and their upper ends pivotally connected to the back, depending links having their upper ends pivotally connected to the frame forwardly of the upstanding links, guide links having their forward ends pivotally connected to the lower ends of the depending links and having their rearward ends pivotally connected to the seat, connecting links connecting the upstanding links to the depending links intermediate their upper and lower ends, and stop means for limiting the forward and rearward movements of the seat and back assembly.

4. In a chair, a frame, seat carriers disposed at opposite sides of the frame, a seat mounted between the seat carriers, a back having its opposite sides pivotally connected at the bottom to the seat carriers, upstanding links having their lower ends pivotally connected to the frame and their upper ends pivotally connected to the back, depending links having their upper ends pivotally connected to the frame forwardly of the upstanding links and having their lower ends connected to the seat carriers, connecting links connecting the upstanding links to the depending links intermediate their upper and lower ends, and stop means for limiting the forward and rearward movements of the seat and the back.

5. In a chair, a frame, seat carriers disposed at opposite sides of the frame, a seat mounted between the seat carriers, a back having its op-

posite sides pivotally connected at the bottom to the seat carriers, upstanding links having their lower ends pivotally connected to the frame and their upper ends pivotally connected to the back, depending links having their upper ends pivotally connected to the frame forwardly of the upstanding links, guide links having their forward ends pivotally connected to the lower ends of the depending links and having their rearward ends pivotally connected to the seat carriers, connecting links connecting the upstanding links to the depending links intermediate their upper and lower ends; and stop means for limiting the forward and rearward movements of the seat and the back.

6. In a chair, a frame, seat carriers disposed at opposite sides of the frame, a seat mounted between the seat carriers, a back having its opposite sides pivotally connected at the bottom to the seat carriers, upstanding links having their lower ends pivotally connected to the frame and their upper ends pivotally connected to the back, depending links having their upper ends pivotally connected to the frame forwardly of the upstanding links, guide links having their forward ends pivotally connected to the lower ends of the depending links and having their rearward ends pivotally connected to the rearward ends of the seat carriers, means for supporting the forward ends of the seat carriers for forward and rearward movements, connecting links connecting the upstanding links to the depending links intermediate their upper and lower ends, and stop means for limiting the forward and rearward movements of the seat and back.

7. In a chair, a frame, seat carriers disposed at opposite sides of the frame, a seat mounted between the seat carriers, a back having its opposite sides pivotally connected at the bottom to the seat carriers, upstanding links having their lower ends pivotally connected to the frame and their upper ends pivotally connected to the back, depending links having their upper ends pivotally connected to the frame forwardly of the upstanding links, guide links having their forward ends pivotally connected to the lower ends of the depending links and having their rearward ends pivotally connected to the rearward ends of the seat carriers, means for supporting the forward ends of the seat carriers for forward and rearward movements comprising front supporting links pivotally connected at their upper ends to the upper ends of the upstanding links and pivotally connected at their lower ends to the forward ends of the seat carriers, connecting links connecting the upstanding links to the depending

links intermediate their upper and lower ends, and stop means for limiting the forward and rearward movements of the seat and back.

8. In a chair, spaced upright chair-supporting standards, upstanding links pivotally connected to said standards near the rear thereof at the approximate level of the chair seat and extending upwardly therefrom, supporting links depending from the upper ends of the upstanding links, a chair back mounted on said supporting links and movable therewith, seat carriers connected to the lower ends of said supporting links, a chair seat mounted on the seat carriers, depending links having their upper ends pivotally connected to the standards above the level of the chair seat, guide links pivotally connecting the lower ends of the depending links to the lower ends of the supporting links, connecting links connecting the upstanding links to the depending links intermediate their upper and lower ends, and stop means for limiting the forward and rearward movements of the seat and back.

9. In a chair, a frame, a seat and back assembly, upstanding links having their lower ends pivotally connected to the frame and their upper ends pivotally connected to the seat and back assembly, depending links having their upper ends pivotally connected to the frame forwardly of the upstanding links and having their lower ends connected to the seat and back assembly, connecting links having their rearward ends pivotally connected to the upstanding links and having their forward ends pivotally connected to the depending links, the ratio of each depending link's entire length to that portion thereof which lies between its connections to a connecting link and a standard being approximately double the ratio of each upstanding link's entire length to that portion thereof which lies between its connections to a connecting link and a standard, and stop means for limiting the forward and rearward movements of the seat and back.

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#### REFERENCES CITED

The following references are of record in the file of this patent:

#### UNITED STATES PATENTS

| Number    | Name  | Date           |
|-----------|-------|----------------|
| 1,877,769 | Knapp | Sept. 20, 1932 |
| 2,365,570 | Lee   | Dec. 19, 1944  |
| 2,506,151 | Hoven | May 2, 1950    |
| 2,529,451 | Hoven | Nov. 7, 1950   |