Nov. 11, 1947. A. LORENZ 2,430,577

ADJUSTABLE RECLINING CHAIR

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Fig. 1.

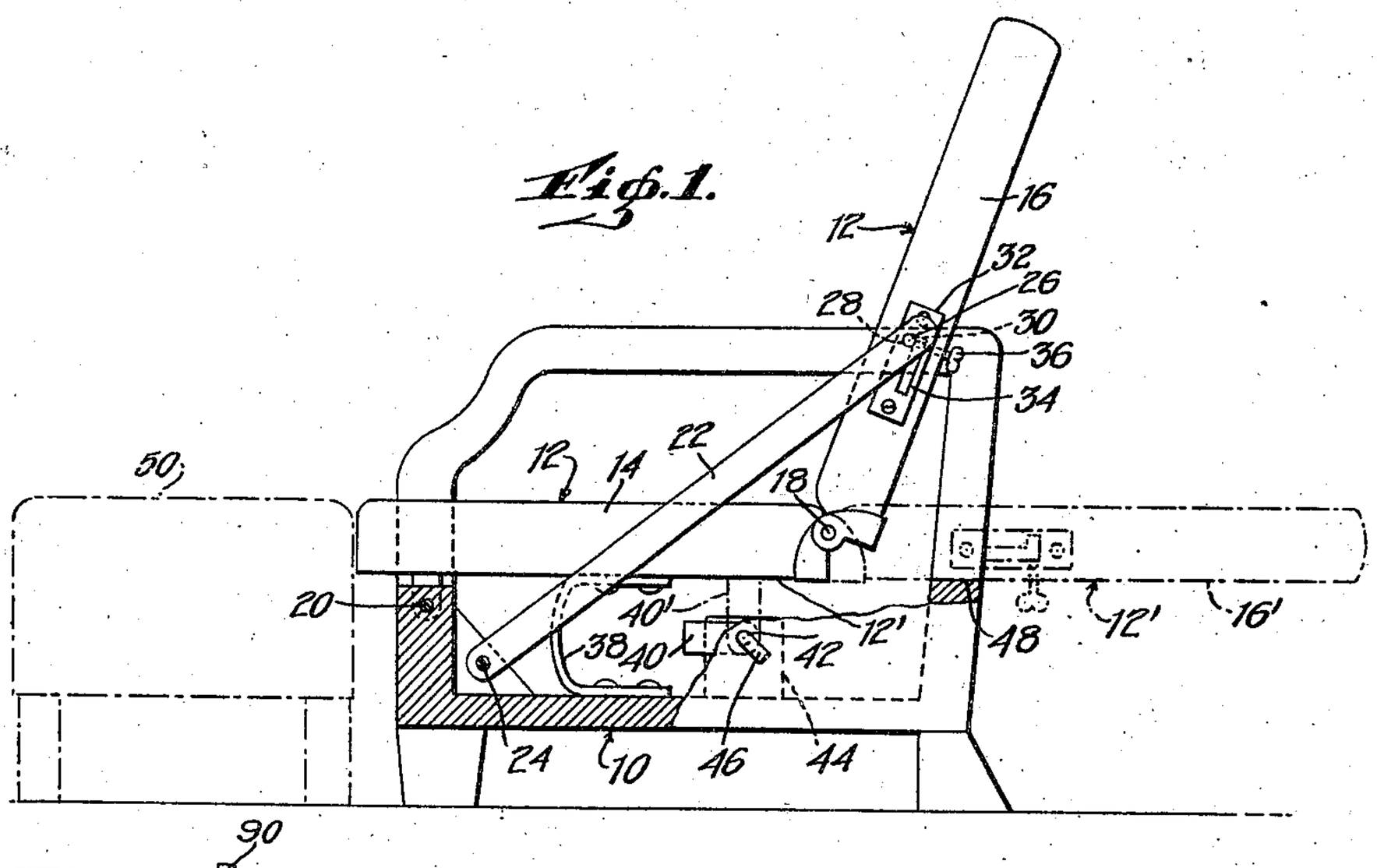


Fig. 2.

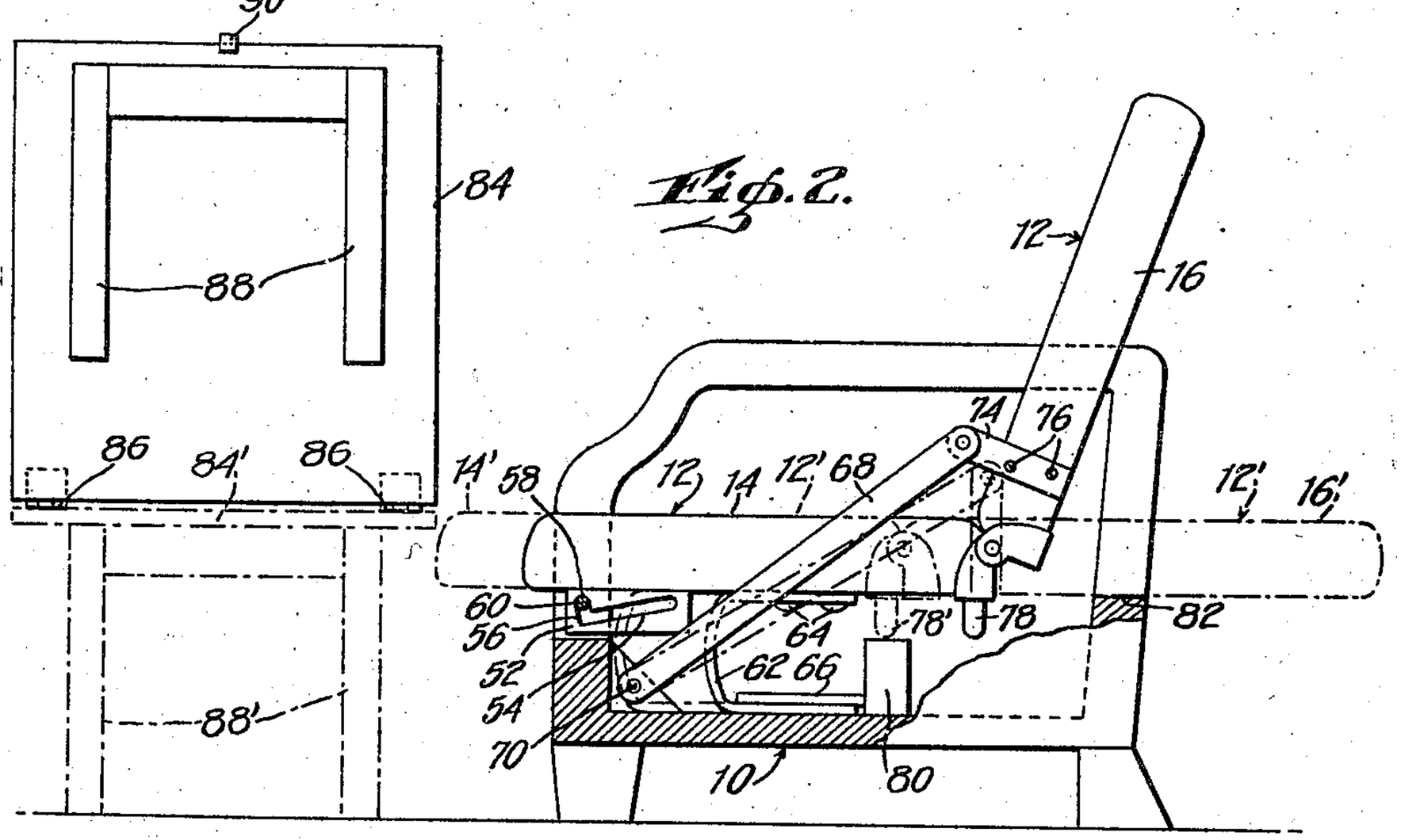


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Fig. 3.

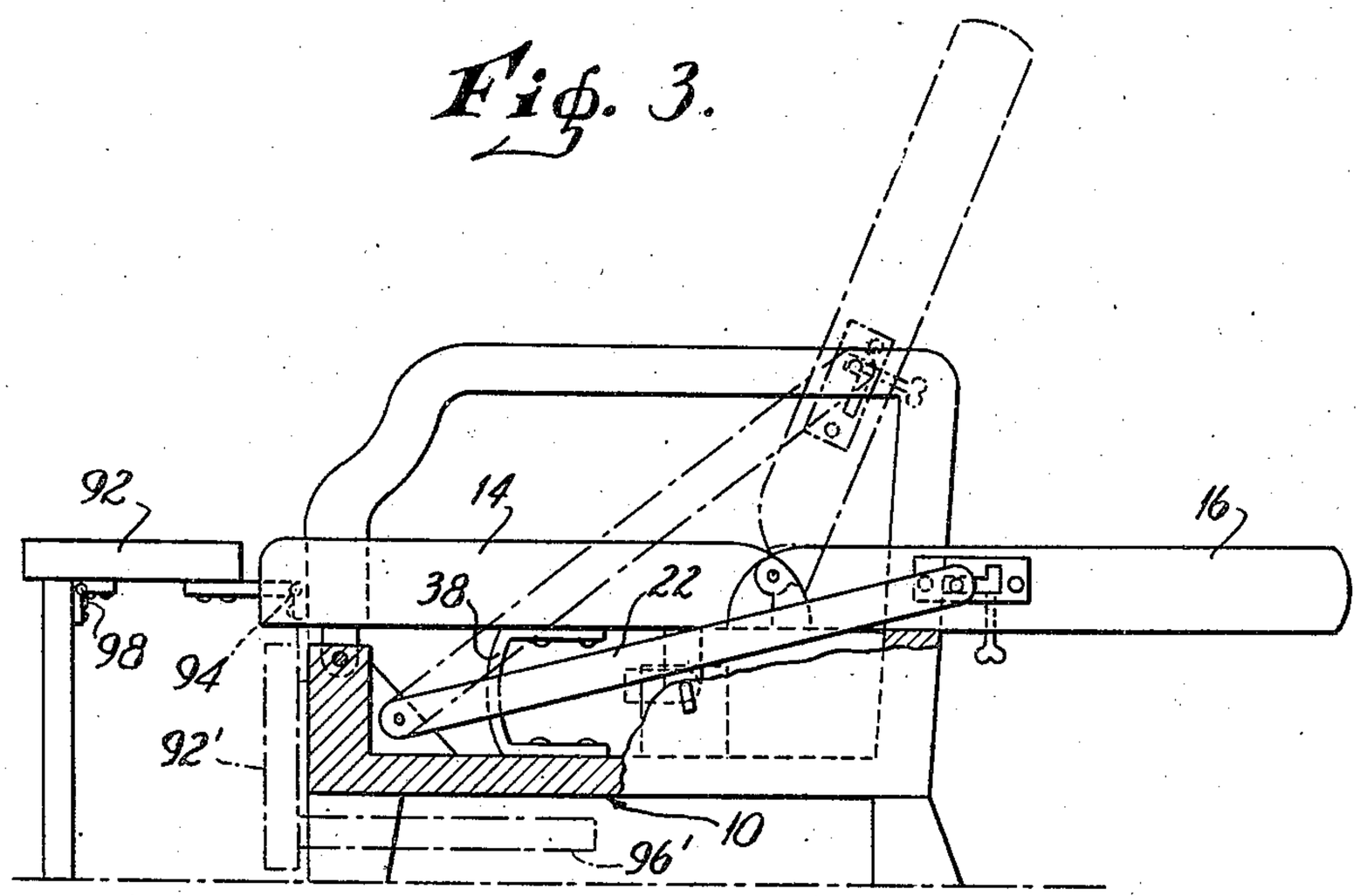
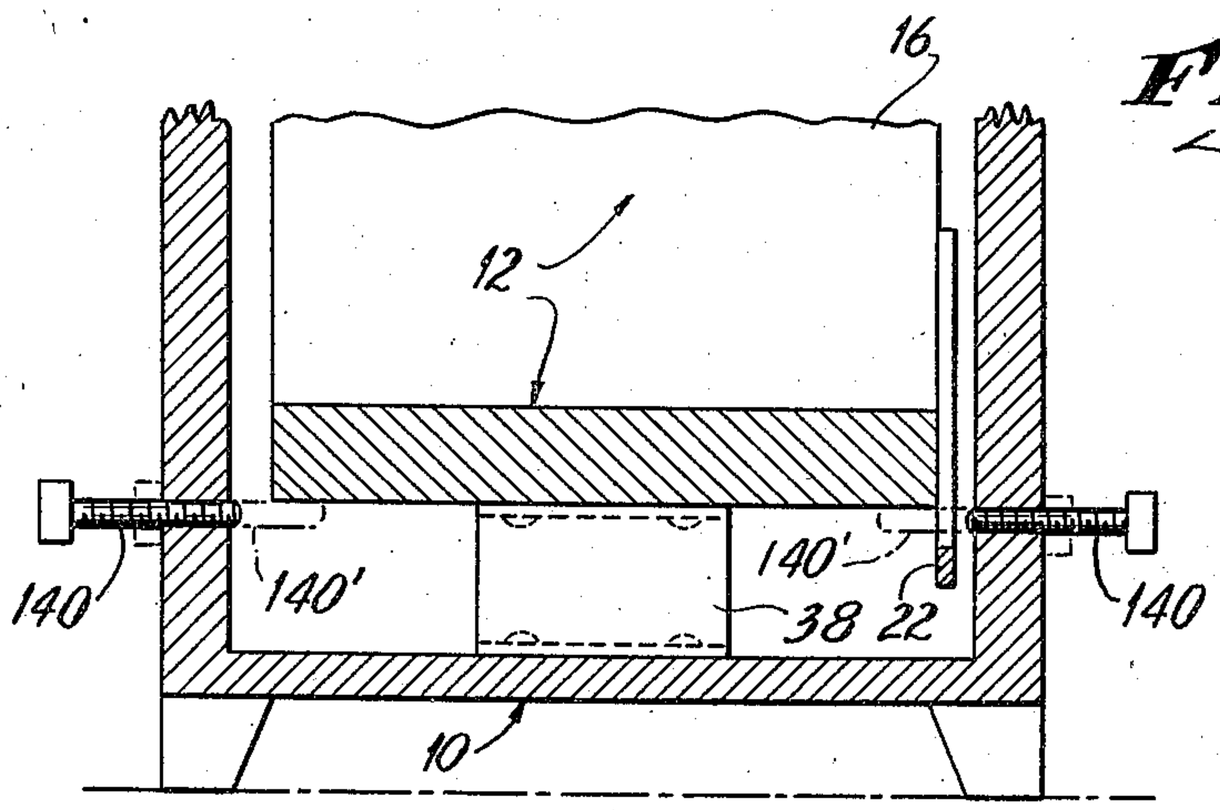



Fig. 4.

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# UNITED STATES PATENT OFFICE

2,430,577

## ADJUSTABLE RECLINING CHAIR

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Application December 30, 1943, Serial No. 516,137

10 Claims. (Cl. 155—45)

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My invention relates to furniture, and more particularly to adjustable reclining chairs, wherein the sitting arrangement including a seat and a back-rest hinged to each other is swingably mounted on a support, and wherein guiding means are provided for a positive control of the relative positions between the seat and the back-rest during a swinging movement of the sitting arrangement about its pivot on the support.

An object of my invention is to provide adjustable chairs of this type, wherein the sitting arrangement may be readily converted into a flat resting arrangement, so that the chair may be used as a bed during night-time.

Another object of my invention is to provide such a convertible adjustable chair with means preventing a movement of the movable parts of the chair when the sitting arrangement is converted into a flat resting arrangement.

With the above and other objects of the invention in view, the invention consists in the novel construction, arrangement and combination of various devices, elements and parts, as set forth in the claims hereof, certain embodiments of the same being described in the specification and being illustrated in the accompanying drawings forming part of this specification, wherein:

Fig. 1 is a side elevational view of an adjustable arm chair according to the invention, which may be converted into a bed-like structure, a portion of the side wall being broken away,

Fig. 2 is a side elevational view of a different embodiment of an adjustable and convertible arm chair according to the invention, a portion of the side wall being broken away,

Fig. 3 is a side elevational view of another embodiment of an adjustable arm chair equipped with a swingable leg-rest, a portion of the side wall being broken away, and

Fig. 4 is a fragmentary vertical sectional view of an adjustable arm-chair similar to that shown in Fig. 1, which, however, is equipped with different holding means for the seat.

Referring now to Fig. 1, 10 generally indicates the supporting frame or support of an arm chair with a sitting arrangement generally indicated by 12. Said sitting arrangement includes a seat 14 and a back-rest 16 hinged to each other at 18, so that the back-rest may be moved relatively to the seat. A pivotal connection 20 between the front end of the seat 14 and the support 10 takes care of a swingable mounting of the sitting arrangement 12 on the support. A guiding link 22 has one of its ends pivoted to the support 10 at a point 24 in the front portion of the chair in a

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plane below the horizontal plane of the front pivot 20 of the seat 14. The other end of said guiding link 22 is normally in a pivotal connection with an intermediate point of the back-rest 16 by means of a pivot 26 operatively engaged with a bearing 28 formed by the end portion of a slot 30 in a guiding plate 32 secured to the back-rest 16 by screws or the like. The slot 30 merges into a guiding slot 34 arranged at a right angle for a purpose to be described hereinafter. The pivot 26 is normally held in operative engagement with the bearing 28 by means of a screw 36 or any other suitable safety means. Therefore, when the user of the chair swings the sitting arrangement 12 about the pivot 20 against the action of a U-shaped spring 38 from the sitting position shown in full lines into a reclined position (not shown), the intermediate point of the back-rest 16 pivotally connected with the guiding link 22 is guided along a circular path by said guiding link, whereby the relative positions between the seat 14 and back-rest 16 are positively controlled.

As will be apparent from above description, the guiding link 22 normally holds the back-rest 16 at an obtuse angle relative to the seat 14 by means of the pivotal connection 26, 28, 32, and the seat 14, the back-rest 16, the guiding link 22 and the stationary portion of the support 10 between the pivots 20 and 24 form a constrained four-bar link-system for controlled movements of the back-rest 16 relative to the seat 14 during a swinging movement of the seat about its pivot 20. According to the invention, however, the adjustable reclining chair of above described type is provided with means, by which said constrained four-bar link-system may be broken up and the above described normal positive control of the relative positions between the seat 14 and the back-rest 16 may be rendered inoperative, so that the sitting arrangement 12 with the back-rest 16 at an obtuse angle to the seat 14 may be readily converted into a flat resting arrangement generally indicated by 12' with the back-rest 16 in the position 16' substantially in alignment with the seat 14.

According to the embodiment of the invention shown in Fig. 1, this conversion of the sitting arrangement 12 into a flat resting arrangement 12' is rendered possible by the following means:

A holding element 40 arranged below the seat 14 is secured to a shaft 42 journalled in a block 44. Said holding element 40, which is normally out of the path of the seat 14 and thereby permits the swinging movements of the sitting ar-

rangement about the pivot 20, may be turned into the upright position 40' shown in dash and dot lines by means of a handle 46 secured to the end of the shaft 42 which projects from the side wall of the chair. In said upright position 40', the holding element 40 is in the path of the seat 14 for holding same in a substantially horizontal position.

After locking the seat 14 by the holding element 40 in the manner described above, the safety screw 36 is loosened, whereupon the pivot 26 may be disengaged from the bearing 28 or end portion of the slot 30 by a slight turning of the back-rest 16 in counter-clockwise direction about the hinge pivot 18. As soon as the pivot 26 enters the guiding slot 34, the back-rest 16 is released, whereupon it may be swung in clockwise direction about the hinge pivot 18 into the position 16' shown in dash and dot lines for alignment with the seat 14, so that a flat resting arrangement 12' is formed. During the above described conversion of the sitting arrangement 12 into the flat resting arrangement, the pivot 26 is in sliding engagement with the guiding slot 34. Preferably, limiting means are provided for holding the back-rest 16 in its extreme position 16' in alignment with the seat 14. For example, the back-rest may come to a rest on an abutment 48 arranged in the supporting frame of the chair, or the hinge 18 is provided with means limiting the angle between the seat and the back-rest to 180°, or any other suitable means having the same effect is used in the chair.

When the sitting arrangement 12 is converted into a flat resting arrangement 12', the chair may be used as a bed or a couch. Under circumstances it may be desirable to extend the flat surface of the flat resting arrangement 12' for a comfortable accommodation of the person resting on the piece of furniture. In such a case a member forming a horizontal extension of the seat 14 may be provided; for example, an ottoman 50 or the like may be placed in front of the chair. Or, as shown in Fig. 3, illustrating in full lines a chair according to the invention with the seat 14 and the back-rest 16 in alignment with each other, a leg-rest 92 swingably mounted on the support 10 at 94 may be swung into the position shown in full lines, whereby it forms an extension of the seat. The leg-rest 92 is held in said full-line position by means of a leg or legs 96 swingably mounted on the leg-rest at 98.

As will be readily understood, for a reconversion of the stationary flat resting arrangement 12' into a swingable sitting arrangement 12 the steps described above are taken in reversed sequence and manner. In the embodiment shown in Fig. 3, of course, during such a reconversion the leg-rest may be swung into the inactive position 92', 96' shown in dash and dot lines.

Furthermore, as will be readily understood, the adjustable holding element 40 may be used for converting the adjustable reclining chair with movable seat and back-rest into a chair, wherein the seat and back-rest are held immovably in a predetermined position. For this purpose, the pivot 26 is held in engagement with the bearing 28 and the holding element 40 is brought into the elevated position 40' for supporting the seat 14 and blocking the sitting arrangement 12. Then, the chair may be used as any ordinary chair with immovable seat and back-rest.

Fig. 4 illustrates a different embodiment of holding means for holding the seat 14 in the horizontal position, which may be substituted for



the adjustable holding member 40 shown in Fig. 1. According to Fig. 4 holding screws 140 are screwed into threaded bores of the side walls of the support 10. When the swingable sitting arrangement 12 is to be used, the holding screws are brought out of the path of the seat 14 into the position shown in full lines. When the sitting arrangement shall be blocked or shall be converted into a flat resting arrangement with the back-rest 16 in alignment with the seat 14 as described above, the holding screws are brought into the position 140' shown in dash and dot lines, so that they project into the path of the seat 14 for holding same in a blocked horizontal position.

The embodiment of the invention shown in Fig. 2 differs from the embodiment shown in Fig. 1 by the arrangement of the disengageable pivotal connection. While according to Fig. 1 the pivotal connection between the guiding link 22 and the back-rest 16 is disengageable, according to Fig. 2 the pivotal connection between the seat 14 and the support 10 is disengageable.

Referring now to Fig. 2, the sitting arrangement 12 comprises the seat 14 and the back-rest 16 hinged to each other at 18. On each side of the chair a plate 52 projects downwardly from the front portion of the seat 14. Each plate 52 has a guiding slot 54 merging into a slot 56 arranged at a right angle. The end portion of said slot 56 forms a bearing 58 for rotatable engagement with a pivot 60 projecting from the supporting frame 10 of the chair. The pivot 60 is normally engaged with said bearing 58 by the action of the weight of the seat 14, so that the sitting arrangement 12 is swingably mounted on the support 10 at the point 60. Safety means, like the safety screw 36 shown in Fig. 1, may be arranged for holding the pivot 60 (Fig. 2) in engagement with the bearing 58, but such safety means are unnecessary owing to the action of the weight of the seat. The seat 14 is under the action of a U-shaped spring 62, one leg of said spring being secured to the seat by rivets 64 or the like, the other leg of said spring being in slidable engagement with a guide 66 mounted on the bottom of the support 10. During the swinging movements of the sitting arrangement 12 about the pivot 60, the relative positions between the seat 14 and the back-rest 16 are positively controlled by the guiding link 68, one end of which being pivoted to the support 10 at 70, the other end of which being pivoted at 72 to a lug 74 rigidly secured to the back-rest 16 by screws 76. Of course, the guiding link 68 could be pivoted directly to the back-rest 16 instead of to a lug 74 projecting therefrom.

If it is desired to convert the sitting arrangement 12 into a flat resting arrangement 12', the seat is slightly lifted for bringing the pivot 60 in slidable engagement with the guiding slot 54 after its disengagement from the bearing 58, whereupon the seat 14 is shifted forwardly, until it reaches the position 14' and the back-rest 16 swinging about the hinge pivot 18 reaches the position 16' in alignment with the seat. During the displacement of the seat 14, a holding member 78 projecting therefrom is brought into the position 78' for engagement with a block 80 so as to hold the seat 14 in a blocked substantially horizontal position. The extreme position 16' of the back-rest may be limited by its engagement with an abutment 82 on the supporting frame 10.

According to the embodiment shown in Fig. 2 it is assumed that the convertible and adjustable reclining chair is used in a carrier for the trans-

port of people, for example in an airplane, and that the extension of the flat resting arrangement 12' may be obtained by a member 84 swingably mounted on the wall of the carrier at 86. Said member 84 having legs 88 hinged thereto is normally held against the wall by a latch 90 or the like. When the member 84 shall be used as an extension of the seat 14, the latch 90 is opened and the member 84 is swung downwardly until it reaches the position 84' with its legs 88 in the position 88' resting on the floor. Of course, any other extension may be used, for example a swingable leg-rest connected with the chair substantially according to the arrangement shown in Fig. 3 or a removable ottoman corresponding to the arrangement shown in Fig. 1, etc. Needless to say, that the folding member 84, 88 shown in Fig. 2 may be used in combination with the chair shown in Fig. 1, or that the holding member may be arranged on the wall to be swung upwardly instead of downwardly as shown in Fig. 2.

The chairs shown in the drawings are only illustrative examples for the application of my invention. It is understood that numerous changes and omissions may be made without departing from the spirit of my invention. For example, different types of disengageable pivotal connections may be used. Moreover, the invention may be applied to chairs having a somewhat different construction than the chairs shown in the drawings.

What I claim is:

1. An adjustable reclining chair or the like comprising: a support, a seat, a pivotal connection between the front portion of said seat and said support for a swingable mounting of the seat, a back-rest, said back-rest being hinged to the rear portion of said seat, a guiding link, a pivotal connection between one end of said guiding link and said support, a pivotal connection between the other end of said guiding link and said back-rest for normally holding same at an angle to the seat, said seat, said back-rest, said guiding link, and the stationary portion of the support between the pivotal connections of the seat and the guiding link with the support thus normally forming a constrained four-bar link-system for controlled movements of the back-rest relative to the seat during a swinging movement of the seat about its pivotal connection with the support, resilient means arranged between said support and a movable member of said link-system for urging said seat upwardly into a sitting position, holding means arranged on the support, said holding means being normally rendered inactive, means associated with said holding means for rendering same temporarily active for cooperation with the seat so as to hold and lock said seat in a substantially horizontal position, at least one of said pivotal connections of said link-system comprising releasable elements whereby said constrained link-system may be broken up temporarily so that said back-rest may be swung substantially into alignment with the seat, and limiting means arranged on a member of the chair for cooperation with the back-rest so as to hold the latter temporarily in alignment with the seat in a substantially horizontal position.

2. In an adjustable reclining chair as claimed in claim 1, said holding means being adjustably mounted on said support and being normally held out of the path of the said swingable seat, and means connected with said adjustable holding means for bringing same temporarily into the path of said swingable seat for cooperation with the latter so as to hold and lock same in the substantially horizontal position.



3. In an adjustable reclining chair as claimed in claim 1, said limiting means being arranged on the support for cooperation with the back-rest.

4. In combination with an adjustable reclining chair as claimed in claim 1, a member arranged for cooperation with the seat so as to form a substantially horizontal extension of the front end thereof.

5. In an adjustable reclining chair as claimed in claim 1, the pivotal connection between said seat and said support comprising the releasable elements, said seat being displaceable in a forward direction upon the release of said releasable elements, and means associated with said seat and said holding means for rendering said holding means automatically active upon such a displacement of the seat in a forward direction.

6. An adjustable reclining chair or the like comprising: a support, a seat, a pivotal connection between the front portion of said seat and said support for a swingable mounting of the seat, a back-rest, said back-rest being hinged to the rear portion of said seat, a guiding link, a pivotal connection between one end of said guiding link and said support, a pivotal connection between the other end of said guiding link and said back-rest for normally holding same at an angle to the seat, said seat, said back-rest, said guiding link, and the stationary portion of the support between the pivotal connections of the seat and the guiding link with the support thus normally forming a constrained four-bar link-system for controlled movements of the back-rest relative to the seat during a swinging movement of the seat about its pivotal connection with the support, resilient means arranged between said support and a movable member of said link-system for urging said seat upwardly into a sitting position, holding means arranged on the support, said holding means being normally rendered inactive, means associated with said holding means for rendering same temporarily active for cooperation with the seat so as to hold and lock said seat in a substantially horizontal position, the pivot of at least one of said pivotal connections of said link-system being disengageably arranged in the bearing of such a pivotal connection whereby upon a disengagement of such a disengageable pivot from its bearing said constrained link-system may be broken up temporarily so that said back-rest may be swung substantially into alignment with the seat, and limiting means arranged on a member of the chair for cooperation with the back-rest so as to hold the latter temporarily in alignment with the seat in a substantially horizontal position.

7. In combination with an adjustable reclining chair as claimed in claim 6, safety means associated with said disengageable pivotal connection for normally holding said pivot in operative engagement with its bearing.

8. In an adjustable reclining chair as claimed in claim 6, said disengageable pivotal connection comprising a plate having a slot merging into a dwell forming the bearing for the pivot.

9. In an adjustable reclining chair as claimed in claim 6, said disengageable pivotal connection comprising a plate having a slot merging into a dwell forming the bearing for the pivot, and said disengageable pivotal connection being

arranged between the front portion of the seat and the support.

10. In an adjustable reclining chair as claimed in claim 6, said disengageable pivotal connection comprising a plate having a slot merging into a dwell forming the bearing for the pivot, and said disengageable pivotal connection being arranged between an intermediate point of the back-rest and the guiding link.

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