LEVER ADJUSTING MECHANISM FOR RECLINING CHAIRS
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ABSTRACT OF THE DISCLOSURE
A lever adjusting mechanism for a three position reclining chair having an extendable footrest. A pair of actuating arms, the end of one of which is centrally pivoted to the other, are arranged such that the pivot point on the footrest support arm through which all extension and retraction forces are applied is at a location when the chair is in the upright position, thus preventing the accidental extension of the footrest. A tension spring returns the chair from the prone to the reclining position when pressure is removed from the back rest.

Background of the invention
This invention relates to a lever adjusting mechanism for a reclining chair with a retractable footrest. The activating lever for the footrest support is a two-arm lever, one of whose arms engages the footrest support while the other arm is connected with a lever that is pivoted on the seat.

A lever adjusting mechanism of the prior art is disclosed in German Patent No. 1,939,254. The lever adjusting mechanism described therein serves exclusively for the adjustment of the chair from the sitting to the reclining position, with the footrest extended. The seat angle, which is formed by the seat and the back rest, remains unchanged. Although the back rest can be tipped toward the rear, by hand, with the help of a special motion, this type of adjustment to the reclining position is difficult when the user is in a sitting position.

It is therefore the overall purpose of this invention to provide a lever adjusting mechanism for a reclining chair by means of which the chair, after adjustment to the reclining position and the extension of the footrest, can in the very simplest fashion be placed into a comfortable prone position and from that back into the reclining position.

Summary of the invention
In accordance with this invention, the activating lever for the footrest support is a two-arm pivoted lever arranged in a swing fashion on the frame. Another connecting lever engages the pivot point of the activating lever on the footrest support. The free end of this other connecting lever runs along the frame and is connected with the lower arm of the two-arm lever by a tension spring. Because the activating lever for the footrest support is pivoted on the two-arm swing lever, the pivot point of the activating lever can be moved upward, although only during the adjustment from the reclining position to the prone position. During the change from the sitting position to the reclining position, the two-arm swing lever is not moved. The pivot point is fixed and the activating lever through its swinging motion prevents the seat and also the center of gravity of the chair from moving too far to the rear so that the chair is prevented from tipping over backward. If a pressure is exerted on the back rest during the reclining position, the back rest will move to the rear and will pull the seat and a traction lever along with it. The traction lever causes the two arm swing lever to be swung around so that the activating lever and, along with it, the footrest and the front part of the seat, are further raised, while the angle between the seat and the back rest is increased.

In this process, the connecting lever is moved to the rear in a guide slot while the lower arm of the swing lever swings forward, so that the tension spring between the two of them is so considerably extended that its force will return the chair to the reclining position when the load on the back rest is relieved. In the sitting position pivoting point of the lever on the footrest support is above the connecting line between the rear pivot point of the footrest support on the seat and a guide pin for the lever on the frame. The pivot point is thus above the dead-center line and, according to the invention, is kept in this position by a spring which connects the connecting lever with the seat so that the footrest cannot fold out or snap out by itself. The tension spring between the connecting lever and the swing lever is easily extended in the sitting position and the spring force serves as an auxiliary force to extend the footrest, that is to say, when the chair is adjusted from the sitting to the reclining position.

The lever adjusting mechanism of this invention makes it possible to adjust the chair from the reclining position to the prone position through simple pressure against the back rest. The footrest cannot snap out unintentionally when in the sitting position, and the chair can be easily adjusted through the auxiliary spring forces.

Brief description of the drawings
The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of a preferred embodiment of the invention, as illustrated in the accompanying drawings, in which:

FIGURE 1 shows a lever adjusting mechanism for a reclining chair with the chair in the sitting position,
FIGURE 2 shows the chair in the reclining position,
and
FIGURE 3 shows the chair in the prone position.

Description of the preferred embodiment
Referring now to the drawings, a chair frame 1 connects the two arm rests 2 with each other and, via the lever adjusting mechanism of this invention, carries seat 3 and back rest 4 of the chair. An angled mounting frame 5 for the lever adjusting mechanism is attached to chair frame 1 by bolts, screws or the like. The seat 3 is carried by mounting brackets 6 and 7, and the footrest support is also pivotally attached to mounting bracket 7. The back rest is attached to mounting bracket 8 which is pivotally connected to both the mounting frame 5 and the seat mounting bracket. Footrest support arms 10 and 11 are pivoted to the front seat mounting bracket 7, and are also pivoted to footrest support arms 12 and 13 in the manner of a pair of scissors. A footrest support bracket 14 serves to fasten the footrest 15. The rear footrest support arm 11 is pivoted at point 33 on the front seat mounting bracket 7 and is designed as a swing, two-arm lever. At the bend of the rear footrest support arm 11 is pivot point 16 for the activating lever 17. This activating lever 17 is designed as a straight, two-arm lever, which is pivoted at point 18 to another two-arm lever 19, which is in turn pivoted on mounting frame 5 at point 35 (FIGURE 3). At the other end of the two-arm activator lever 17, arm 20 is pivoted which serves as a push-pull rod and whose rear pivot end is pivotally attached to the lower end of seat mounting bracket 6. A bending arm on mounting frame 5 by a bolt 22 and pin 23 arrangement. The free end of connecting arm 21 is also connected with the lower arm of the two-arm lever 19.
by means of a tension spring 24. Another tension spring 25 is arranged between the free end of connecting arm 21 and seat mounting bracket 6. The two-arm lever 19 can swing between two limit pins 31 and 32 on mounting frame 5.

In the sitting position shown in FIGURE 1, pivot point 16 of activating lever 17 and connecting arm 21 is located above the line between pivot point 33 on the front seat mounting bracket 7 and pin 23 on the mounting frame 5. The pivot point 16 thus lies above the dead-center line and is biased in this position by spring 25 which exerts a force via the connecting arm 21 toward the front side of the chair, so that footrest 15 is kept in its retracted position while the chair is in the sitting position and cannot accidentally snap out by itself. Guide pin 23 in this position is located roughly in the forward third of slot 22.

To adjust the chair from the sitting to the reclining position, the user need only exert a slight rearward pressure against the two arm rests 2, so that the seat 3 will perform a relative backward motion with respect to frame 1 and mounting frame 5. The push-pull rod 20 also moves to the rear with seat 3 since it is pivoted on seat mounting bracket 6. This pivots the activating lever 17 around its point of rotation 18 so that the footrest is extended out. The footrest is extended not only through the relative motion of the seat with respect to the frame, but also through the motion of lever 17. This is why seat 3 need not be shifted very far back with respect to the frame, so that the center of gravity likewise is not shifted too far to the rear and thereby the chair is prevented from tipping over the rear casters 29. The force of spring 24, which is slightly tensed in the sitting position, provides an auxiliary force in extending the footrest. During the extension movement of slot 22 moves with respect to guide pin 23 in such a way that the latter, first of all, comes to rest against the front end of slot 22 as the dead-center position is reached, and then comes to rest on the rear end of the slot when the footrest is fully extended. Thus, the guide pin 23 limits the extension movement of the footrest. When the footrest is fully extended, there is almost no tension on spring 24.

The chair is now in the reclining position as shown in FIGURE 2. That is to say, the footrest is extended, the seat is slightly inclined toward the rear, but the angle between the seat and the back rest is unchanged with respect to the sitting position. If the user now presses with his back against back rest 4, the backrest will pivot or swing around point 34 on mounting frame 5 which is in a fixed position with respect to the chair frame 1, and thus pulls the seat 3 to the rear via seat mounting bracket 6. Mounting bracket 6 transmits this motion to the rod 20 which is pivoted to the lower end of the activating lever 17. Because the footrest is fully extended, the activating lever 17 can no longer perform any further swinging motion. Therefore, the force of rod 20 is transmitted via pivot point 18 to the two-arm lever 19 which, in turn, is swung around its own pivot point 35 on mounting frame 5, stretching spring 24, until it reaches stop pin 32. The longitudinal axes of levers 17 and 19 become parallel (FIGURE 3), the front part of seat 3 as well as the footrest 15 are raised even more, and the angle between seat 3 and back rest 4 is considerably increased so that a comfortable prone resting position is reached. Connecting arm 21 moves to the rear so that pin 23 roughly comes to lie in the middle of slot 22. Because the lower arm of lever 19 is moved forward and because the rear end of connecting arm 21 moves to the rear, spring 24 is extended very heavily. If the user now sits up, that is to say, if the force acting upon back rest 4 is removed, then spring 24 pulls the lever 19 to the rear, around the lever's pivot point 35, until it reaches stop pin 31, while the connecting arm 21 is pulled forward, until slot 22 rests with its rear end on pin 23. As a result, the back rest is returned to its normal position with respect to seat 3 and the seat is at the same time removed slightly forward so that the entire chair is once again in the reclining position as shown in FIGURE 2. Spring 24 thus acts as a recovery spring so that the chair is returned from the prone position to the reclining position when the force against the back rest 4 is removed.

In the upper part of the rear back rest support 26, a headrest 27 can be mounted on an arm 28 in such a way that it can be swung into the inside space of the back rest when not in use.

What is claimed is:

1. A lever adjusting mechanism for a reclining chair having an extendable footrest including an activating lever for the footrest having one end pivotally connected to a footrest support arm and the other end pivotally connected to one end of a push-pull rod whose other end is pivotally connected to the chair seat, comprising:

(a) a lever pivotally mounted intermediate its ends to the chair frame and having one end pivotally connected to the activating lever at a point intermediate the ends of the lever,

(b) a connecting arm pivotally mounted at one end to the pivot point connecting the activating lever and the footrest support arm and slidably mounted at the other end to the chair frame, and

(c) a tension spring connected between the other end of the connecting arm and the other end of the lever.

2. A lever adjusting mechanism as defined in claim 1 wherein the connecting arm is slideably mounted to the chair frame by means of a guide pin with slot arrangement.

3. A lever adjusting mechanism as defined in claim 2 wherein the footrest support arm is pivotally mounted to the chair seat and the pivot point connecting the support arm, activating lever and the connecting arm lies above a line between the guide pin and the pivot point connecting the support arm and the chair seat when the chair is in the upright or sitting position.

4. A lever adjusting mechanism as defined in claim 1 further comprising a tension spring connected between the other end of the connecting arm and the chair seat.

5. A lever adjusting mechanism as defined in claim 1 wherein the chair back rest is pivotally connected at its lower end to both the chair seat and the chair frame, whereby the angle between the back rest and the seat may be increased.

6. A lever adjusting mechanism as defined in claim 1 in which the tension spring acts to extend the footrest when the chair is moved from a sitting position and to return the chair from a prone position to a reclining position when pressure is removed from the back rest.

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297—68, 75