Oct. 19, 1954 R. A. CRAMER 2,692,012

ADJUSTABLE CHAIR BACK PIVOTED ABOVE SEAT

Original Filed March 29, 1946 2 Sheets-Sheet 1

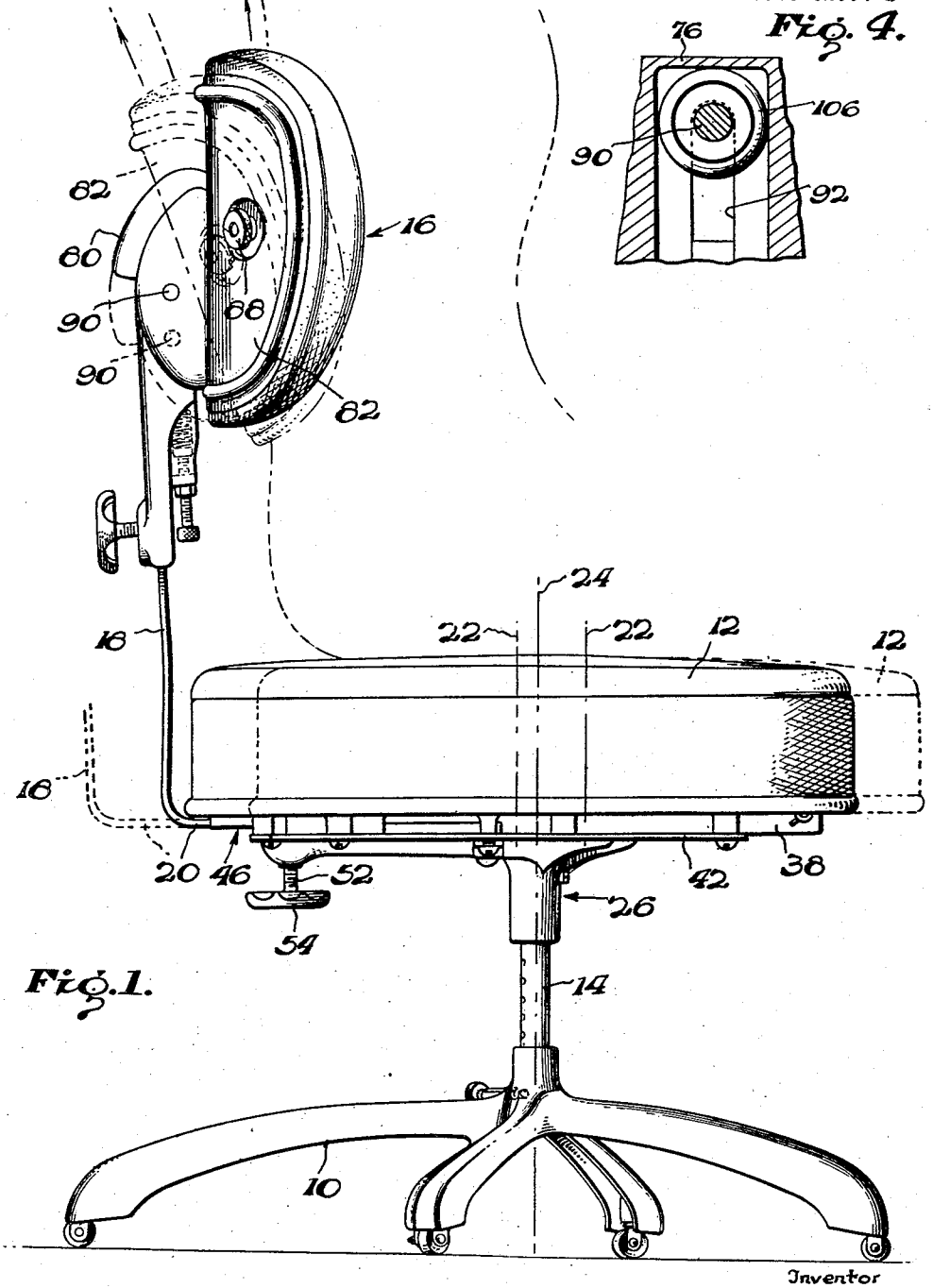

Fig. 1.

Fig. 4.

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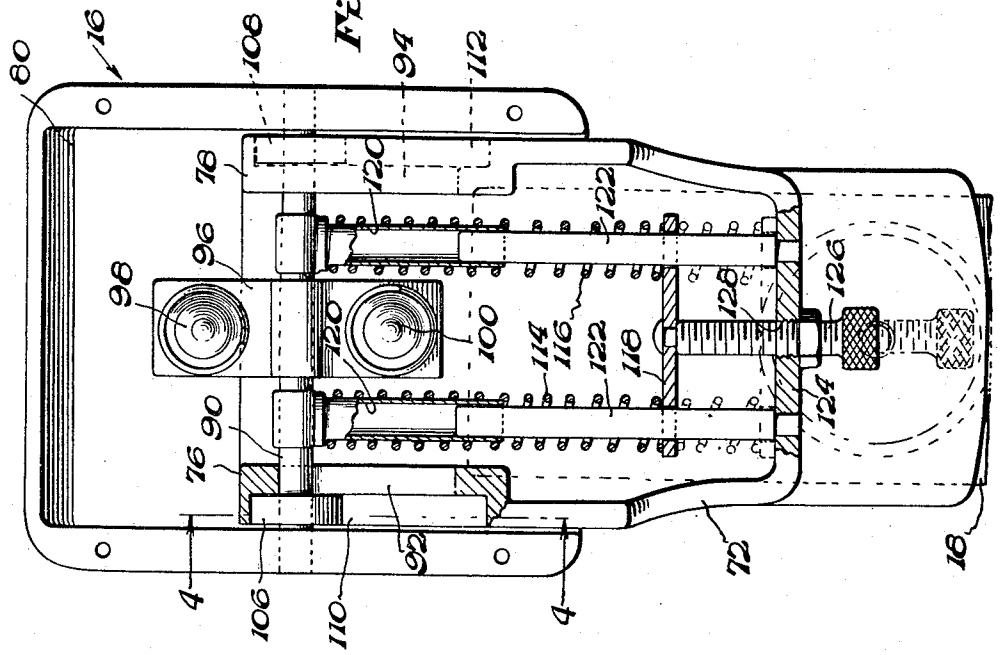
Fig. 3.



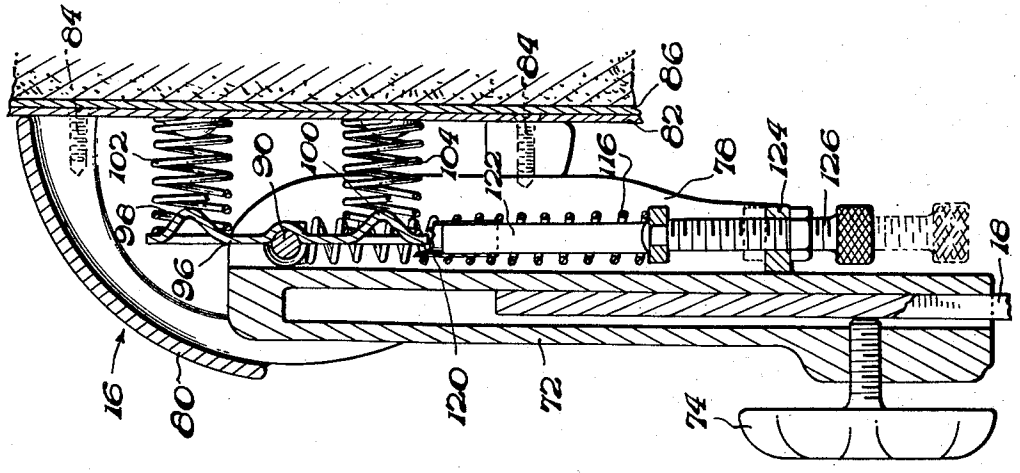


Fig. 2.

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UNITED STATES PATENT OFFICE

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ADJUSTABLE CHAIR BACK PIVOTED ABOVE SEAT

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Original application March 29, 1946, Serial No. 658,270, now Patent No. 2,538,507, dated January 16, 1951. Divided and this application May 31, 1949, Serial No. 96,228

14 Claims. (Cl. 155—156)

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This invention relates to chairs and more particularly to improvements in chairs of the posture type adapted for office use, although it will be understood that the improvements may be advantageously employed in chairs adapted for other uses.

Posture chairs of the general type to which this invention relates have heretofore been provided with various types of adjustments in order that the positions of the seat and back rest may be readily varied to secure a comfortable and proper posture position for the particular user of the chair. For example, the back rest has been so arranged as to be tiltable as well as adjustable vertically and horizontally with respect to the seat in an effort to arrange the back rest in a proper position. In making such adjustments in the prior chairs, the back rest support was first adjusted horizontally and vertically with respect to the seats after which the support for the back rest was locked in position. With such an arrangement, it has been found that even with the back rest arranged for tilting movement about a horizontal pivot, the user's back was subjected to a considerable amount of "back rub" as he leaned back in the chair a repeated number of times. This operation caused the user's garment, which was in contact with the back rest, to be stretched upwardly and subjected his back to an uncomfortable rubbing action.

In the prior chairs, it was also determined that when the back rest support was adjusted to move the back rest rearwardly of the seat, the weight distribution of the user of the chair was such that the chair was unstable with respect to its support. For example, in such case, the center of gravity of the user of the chair would be shifted to the rear of the center of support of the chair seat and the chair would have a tendency to tilt backwardly. This resulted in an undesirable unstable condition.

It is accordingly one of the objects of the present invention to provide a posture chair which is so constituted as to avoid the disadvantages and objectionable features referred to above.

Another object is to provide a novel posture chair construction which is provided with a back rest so constructed as to entirely eliminate "back rub" when the chair is in use.

Still another object is to provide a novel back rest construction in a chair of the above type, which is so arranged as to be automatically tiltable about a horizontal axis above the seat, and also arranged to be automatically adjustable vertically of the seat, these combined adjustments being automatically effected by the back of the user and resulting in the complete elimination of "back rub."

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A further object includes the provision of a floating back rest for a chair of the above character which automatically accommodates itself to the user's back, thus securing an exceedingly comfortable back support without "back rub."

A further object includes a novel chair construction embodying the foregoing highly desirable and advantageous results which include the adjustments heretofore stated and which function to fully and comfortably adapt the chair to the users thereof, the structure embodying relatively few parts and thus being capable of being economically manufactured.

Other objects and novel features of the invention will appear more fully hereinafter, from a consideration of the following detailed description when taken in connection with the accompanying drawings wherein the invention is illustrated. It is to be expressly understood, however, that the drawings are utilized for purposes of illustration only, and are not designed as a definition of the limits of the invention, reference being had for this latter purpose to the appended claims.

In the drawings, wherein similar reference characters refer to similar parts throughout the several views:

Fig. 1 is a side view of a chair constructed in accordance with the principles of the present invention and illustrating in dotted lines, the various adjustments which may be effected;

Fig. 2 is a vertical sectional view of the back rest and illustrates the construction for securing the combined automatic tilting and the vertical movement of the back rest;

Fig. 3 is a front view of the back rest construction with the back rest cushion and supporting plate removed, and

Fig. 4 is a partial sectional view taken along line 4—4 of Fig. 3 and illustrates one of the guides for securing the automatic vertical movement of the back rest.

Referring more particularly to Fig. 1, a novel chair construction embodying the principles of the present invention is illustrated therein as including a base 10 adapted to support a seat 12 by means of a pedestal 14, the latter being adjustable in the base in any suitable manner in order to adjust the height of the seat. A back rest 16 is adjustably secured to the upper portion of a back rest support 18, the latter being preferably formed of metal having some yield-

ability and being bent into an L-shaped form having an arm 20 which is adjustably carried beneath the seat 12 by a block 46, a set screw 52 provided with a hand wheel 54 being adapted to hold the arm 20 in any desired position of adjustment. As shown, the seat 12 and the back rest 16 are provided with cushions, preferably of the latex foam type, and these are provided with suitable covers which are maintained in position by any convenient arrangement.

One of the features of the present invention resides in the provision of a novel construction for maintaining the stability of the chair, irrespective of the adjustment of the back rest support 18 to accommodate the chair to different size persons. In the form of the invention illustrated, such feature comprises an arrangement which is operative to automatically shift the position of the seat 12 with respect to the pedestal 14, as the back rest support 18 is moved in a direction toward and away from the seat. More particularly, and referring to Fig. 1, the full line position of the support 18 and the seat 12 is such that the former is closely adjacent the rear edge of the latter, and the center of the seat 12 as shown at 22, is slightly to the rear of the center line 24 of the pedestal 14. It has been determined, that in the majority of cases when the parts are arranged in this manner, the center of gravity of the user of the chair, will substantially coincide with the center line 24 of the pedestal, in which event, the chair is perfectly stabilized when in use.

In the event however, that a deeper seat is found to be desirable, and the support 18 is moved rearwardly toward the dotted line position, the present invention includes an arrangement for moving the seat 12 forwardly with respect to the pedestal 14 toward the dotted line position shown in Fig. 1. It will thus be clear that in such position, while the center 22 of the seat 12 is positioned forwardly of the center line 24 of the pedestal, as shown in dotted lines, still the center of gravity of the user, will substantially coincide with the center 24 of the pedestal 14. In this manner, it will be appreciated that the stability of the chair under various positions of adjustment, will be maintained. Hence the construction is such that the seat 12 and the support 18 are interconnected and that the adjustment of one automatically effects the adjustment of the other. For the details of such an arrangement, reference is made to the patent to Roy A. Cramer No. 2,538,507, dated January 16, 1951, for Adjustable Chair, of which the present application is a division.

The present invention is more particularly directed to a floating back rest construction which is so arranged as to eliminate "back rub" when the chair is in use. Referring more particularly to Figs. 1, 2 and 3, the foregoing desirable result is achieved by mounting the back rest 16 on the upper end portion of the support 18 in such a manner that the back rest may not only tilt or pivot about a horizontal axis, but may also move in a substantially vertical plane. Thus, when the chair is in use and pressure is exerted against the back rest to flex the support 18, the back rest will automatically shift with the back of the user, thereby eliminating the uncomfortable "back rub" inherent in the prior types of posture chairs.

More particularly, and referring to Figs. 1, 5 and 6, a hollow sleeve 72 is adjustably secured as by means of a hand screw 74, to the support 18, and is provided at its upper portion with a pair of flanges 76 and 78 for mounting the back rest 16. The latter includes a hollow box 80 to which a cushion supporting plate 82 is secured through screws 84, it being pointed out that a second plate 86 which carries the back rest cushion and cover, is attached to the plate 82 by means of a pair of screws having thumb nuts 88, see Fig. 1.

For the purpose of interconnecting the sleeve 72 and box 80, the latter carries a pivot shaft or pin 90 which extends through slots 92 and 94 formed in the respective flanges 76 and 78. A strap 96 is secured to the central portion of the pin 90 and is provided with a pair of seats 98, 100 for respectively maintaining springs 102 and 104 in the position illustrated. These springs, when assembled, are placed under a slight initial tension, and in the normal position of the parts, serve to maintain the back rest in a substantially vertical position. It will be clear, however, that in use, the back rest may tilt or rock about the axis of the pin 90, and thus accommodate itself, to the inclination of the user's back.

In view of the mounting of the pivot pin 90 in the slots 92 and 94 of the sleeve 72, it will be readily understood that the back rest 16 may be moved in a substantially vertical plane. While the slots may if desired, be used to guide the pin 90, it is preferred to utilize roller bearing assemblies 106 and 108 which are carried by the pin 90 and which travel in tracks or guides 110 and 112 formed in the respective flanges 76 and 78 during movement of the back rest 16 with respect to the support 18. Normally, the pin 90 and back rest 16 are maintained in the position illustrated, as by means of a pair of springs 114 and 116 which are interposed between the pin 90 and a plate 118. Telescoping parts 120 and 122, respectively secured to the pin 90 and carried by a bracket 124 formed on or carried by the sleeve 72, constitute guides for the springs, it being understood that this construction serves to maintain the springs in the vertical position illustrated. From the foregoing it is seen that the back rest 16 is yieldingly mounted for vertical movement with respect to the support 18 and that during such movement the mechanism permitting tilting movement of the back rest and including the strap 96 and springs 102 and 104 moves with the back rest. Thus with the chair in use, the back rest automatically tilts or rocks about the axis of pin 90 and at the same time, shifts in a vertical direction in order to accommodate itself to the position of the back of the user, and thereby eliminates all "back rub."

Means are preferably provided by the present invention to adjust the tension of the springs 114 and 116 in order to vary the force required to shift the back rest downwardly. In the form of the invention illustrated, such means includes an adjusting screw 126 which projects through a threaded opening 128 in the bracket 124 and is attached to the plate 118. If desired, a lock nut may be employed to lock the screw 126 in any desired position of adjustment.

There has thus been provided by the present invention a novel posture chair construction which embodies a number of advantageous features all of which materially contribute to the comfort of the user. The various adjustments which have been provided, enable the chair to be quickly adapted to any individual. The floating back rest presents a highly desirable feature and greatly adds to the comfort of the user in

the complete elimination of "back rub" when the user leans back in the chair.

While the invention has been shown and described herein with considerable particularity, it will be understood by those skilled in the art, that various changes and modifications thereof may be resorted to without departing from the spirit of the invention. Reference will therefore be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. A chair comprising a seat, supporting means for the seat, a supporting member carried by the seat and provided at its upper end with a back rest, means for resiliently supporting said back rest on the supporting member for bodily movement in a vertical plane with respect to said supporting member, and other means for resiliently supporting said back rest for tilting movement with respect to said supporting member about a horizontal pivot independently of said bodily movement.

2. A chair comprising a seat, supporting means for the seat, a supporting member carried by the seat, a back rest, means including a horizontally disposed pivot for yieldingly mounting said back rest for tilting movement with respect to the upper end of said member, and separate means yieldingly mounting the back rest for bodily movement in a vertical plane with respect to said member independently of said tilting movement.

3. In a chair having a back rest supporting member, a sleeve slidably embracing the upper end of said member, a back rest pivotally connected with the upper portion of the sleeve for tilting movement with respect thereto, means for mounting the back rest for vertical movement with respect to the sleeve and including a first part connected with the back rest and a second part connected with said sleeve, and resilient means normally maintaining the back rest in an upper position but allowing yielding downward vertical movement thereof with respect to said sleeve.

4. A chair comprising a seat, supporting means for the seat, a supporting member carried by the seat, a back rest, means including a horizontally disposed pivot for yieldingly mounting said back rest for tilting movement with respect to the upper end of said member, means for mounting said pivot and back rest for vertical movement with respect to said upper end and including a first part connected with the back rest and a second part connected with said upper end, and resilient means for yieldingly opposing vertical movement of the pivot and back rest in one direction with respect to said upper end.

5. A chair comprising a seat, supporting means for the seat, a supporting member carried by the seat, a back rest, means carried by the upper end of said member and including a pivot for yieldingly mounting the back rest for tilting movement, and means including a pair of slots arranged in the second named means for yieldingly mounting said pivot and back rest for vertical movement.

6. In a chair having a back rest support, a member adjustably mounted at the upper end of said support, a back rest, the upper part of said member being provided with a pair of substantially vertically arranged guide slots, a pivot pin extending through said slots for mounting the back rest for tilting movement, first resilient means for yieldingly opposing such tilting movement, a support for said resilient means carried by said pin, and other resilient means carried by said member for yieldingly opposing downward movement of said pin, said back rest and the last named support.

7. A chair as defined in claim 6 which comprises in addition, means for adjusting the tension of said other resilient means.

8. A chair comprising a seat, supporting means for the seat, a back rest supporting member carried by the seat, a back rest, means carried by the upper end of said member and including a horizontally arranged pivot pin for resiliently mounting the back rest for tilting movements about said pin, a pair of vertically disposed slots arranged in the second named means for receiving opposite end portions of said pin to allow vertical movement of said pin and back rest with respect to said supporting member, and a pair of springs interposed between a part of the second named means and said pin to resiliently oppose said vertical movement.

9. A chair comprising a seat, supporting means for the seat, a back rest support carried by the seat, a member adjustably mounted at the upper end of said support, a back rest, means including a horizontally arranged pivot pin carried by the upper end portion of said member for resiliently mounting the back rest for tilting movements about said pin and with respect to said member, a pair of vertically disposed slots arranged in said member for receiving opposite end portions of said pin to allow vertical movement of said pin and back rest with respect to said member, a pair of telescoping parts respectively carried by said pin and member for relative movement during said vertical movement, and a spring surrounding said telescoping parts to resiliently oppose said vertical movement.

10. A chair as set forth in claim 9 which comprises in addition, means for adjusting the tension of said spring.

11. A chair as set forth in claim 9 wherein the spring, at one end thereof, bears against the pivot pin, and at the other end thereof, abuts a plate, together with means carried by said member to adjust the position of said plate to adjust the tension of the spring.

12. A chair comprising a seat, supporting means for the seat, a back rest support carried by the seat, a member adjustably mounted at the upper end of said support, a back rest, a horizontally arranged pivot pin carried by the upper portion of said member for supporting said back rest, means including a pair of springs respectively positioned above and below said pivot pin for normally maintaining said back rest in a normal substantially vertical position and allowing yielding tilting movements thereof in opposite directions about said pivot pin, and means for resiliently supporting the back rest and pivot pin for bodily movement in a vertical plane independently of said tilting movements, comprising guide means carried by said member and cooperating with said pivot pin for guiding the latter for movement in a vertical plane, and a spring interposed between said pivot pin and said member for resiliently opposing such movement of the pivot pin in a vertical plane.

13. A chair as set forth in claim 12 which comprises in addition, means for adjusting the tension of the last named spring.

14. In a chair having a back rest support, a sleeve slidable on the upper end of said support,

a back rest, a horizontally arranged pivot pin carried by the upper portion of said sleeve for supporting said back rest for pivotal movement, means including a pair of springs for yieldably resisting said pivotal movement, and means for resiliently supporting the back rest and pivot pin for bodily movement in a vertical plane independently of said pivotal movement, comprising guide means formed in said sleeve and cooperating with said pivot pin for guiding the latter for movement in a vertical plane, and a pair of spaced-apart springs respectively interposed between said pivot pin and said sleeve for resiliently opposing said last named movement.

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