June 15, 1937. L. E. GOENEN 2,083,838

CHAIR

Filed May 19, 1934 2 Sheets-Sheet 1

Fig. 1

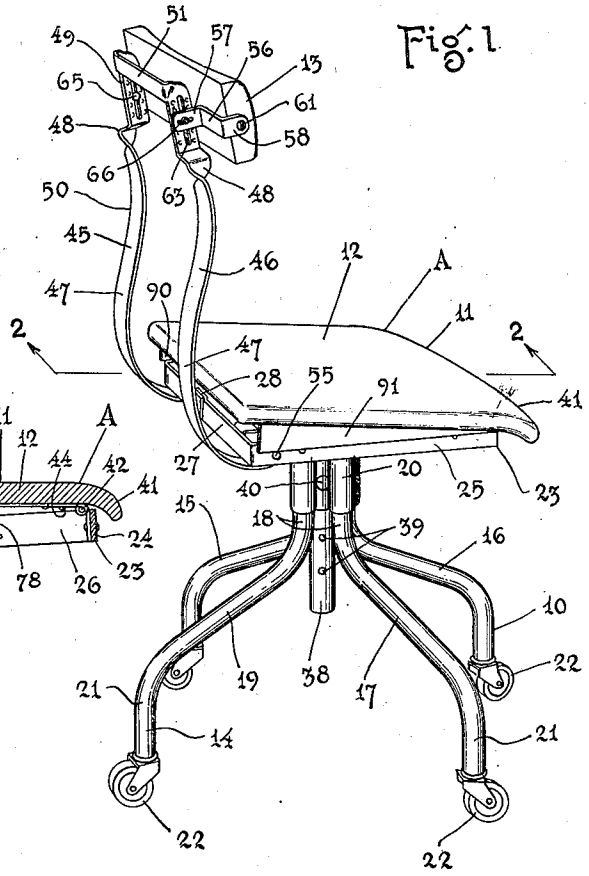



Fig. 2

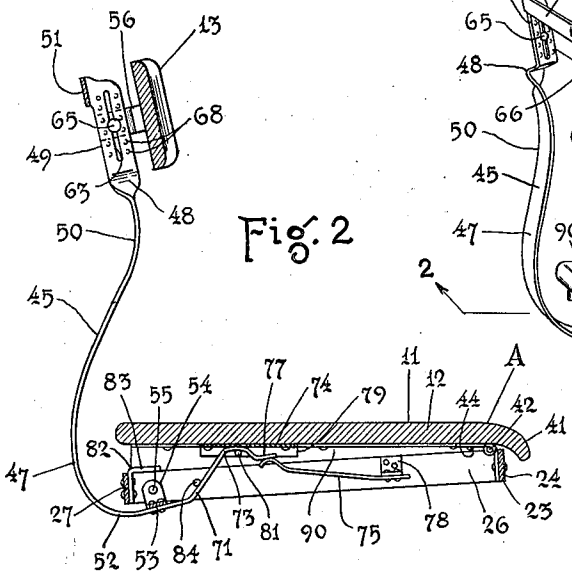
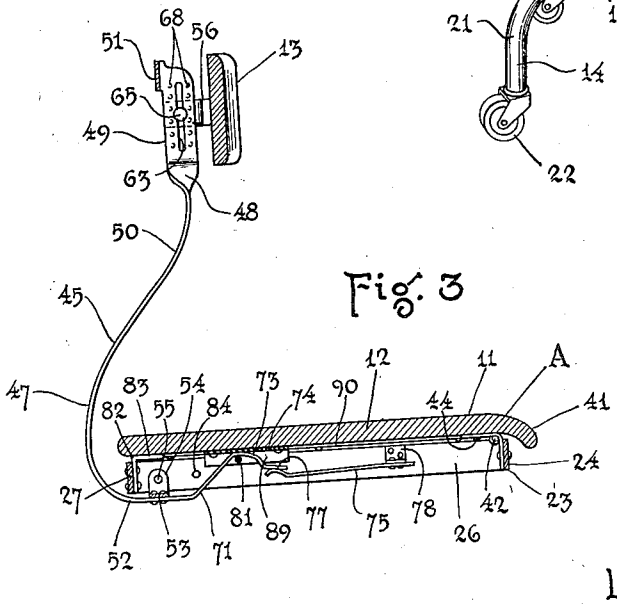



Fig. 3

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CHAIR

Filed May 19, 1934 2 Sheets-Sheet 2

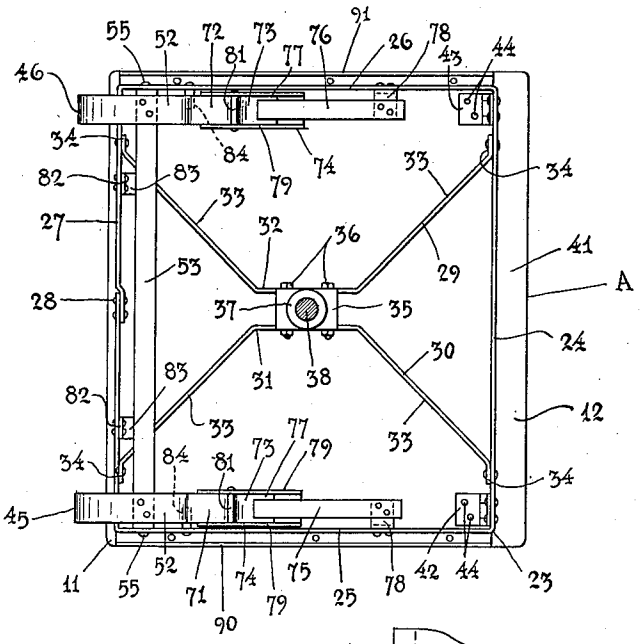



Fig. 4

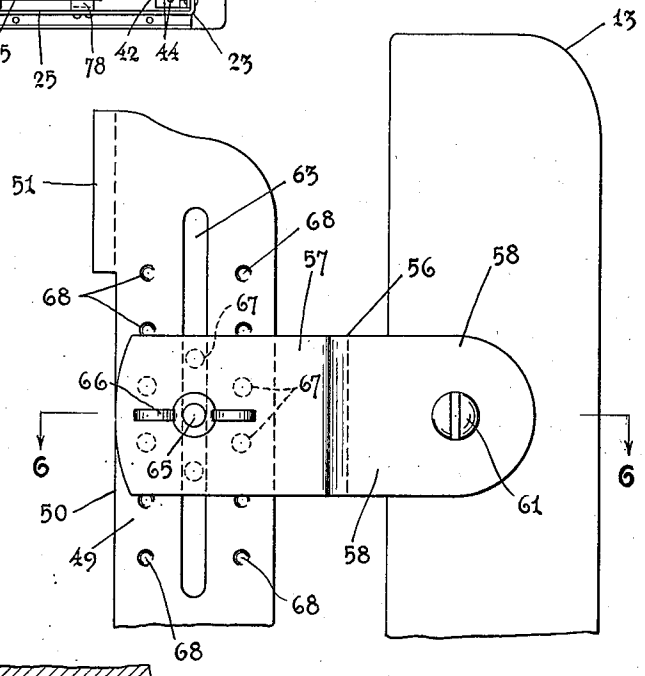
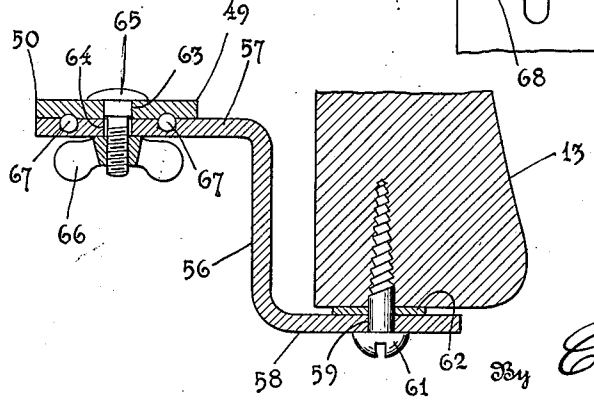



Fig. 5

Fig. 6

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2,083,838

# UNITED STATES PATENT OFFICE

2,083,838

## CHAIR

Leo E. Goenen, St. Paul, Minn., assignor to Fritz-Cross Company, St. Paul, Minn., a corporation of Minnesota

Application May 19, 1934, Serial No. 726,516

10 Claims. (Cl. 155—53)

My invention relates to chairs and has for an object to provide a chair constructed with a back rest adapted to be automatically adjusted to fit the back of the occupant when the occupant seats himself upon the seat of the chair.

Another object of the invention resides in providing a chair constructed with a frame having a back rest mounted thereon for movement in a back and forth direction.

A still further object of the invention resides in providing a seat on the chair, mounted thereon for up and down movement.

An object of the invention resides in providing a device for moving said back rest in a back and forth direction upon movement of the seat in an up and down direction.

Another object of the invention resides in providing an upright pivoted at its lower end to the frame of the chair and carrying at its upper end the back rest.

A feature of the invention resides in providing an arm attached to said upright, movable with said upright, and extending below said seat, said arm being adapted to being moved through the action of said seat to swing the upright and cause the back rest to travel in a back and forth direction.

A feature of the invention resides in pivoting the seat to the frame.

Another object of the invention resides in mounting the back rest for vertical adjustment relative to the upright.

Other objects of the invention reside in the novel combination and arrangement of parts and in the details of construction thereof.

In the drawings:

Fig. 1 is a perspective view of a chair illustrating an embodiment of my invention.

Fig. 2 is an elevational sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a view similar to Fig. 2 showing the parts in altered position.

Fig. 4 is an inverted plan sectional view of the chair shown in Fig. 1.

Fig. 5 is a fragmentary elevational view of the supporting structure for the back rest, drawn to a larger scale.

Fig. 6 is a plan sectional view taken on line 6—6 of Fig. 5.

In the use of chairs it frequently occurs that the occupant assumes various positions on the chair and it becomes highly desirable, where a back rest is provided, that the back rest function in the desired manner regardless of the position of the occupant on the chair. The present invention provides a construction by means of which the back rest is automatically moved into position to engage the back of the occupant when the occupant seats himself upon the chair and regardless of his position on the chair.

For the purpose of illustrating my invention, I have shown the invention as embodied in a stenographer's chair, or a chair used for similar purposes. This chair is indicated in its entirety by the reference character A and comprises a base 10 which supports a superstructure indicated by the reference character 11. This superstructure includes a seat 12 and further includes a back rest 13, both mounted in a manner to be automatically adjusted through the action of the seat 12. These various parts will now be described in detail.

The base 10 consists of four legs 14, 15, 16 and 17, which are preferably constructed of metal tubing bent to form longitudinally extending portions 18 and radially extending portions 19 projecting outwardly from the longitudinally extending portions. The longitudinally extending portions 18 are mounted in a head 20 and are rigidly secured thereto so as to cause the radially extending portions 19 to project outwardly from head in the desired manner. The extreme ends of the legs are bent downwardly as designated at 21 and are provided with casters 22 by means of which the chair may be supported on the floor.

The superstructure 11 includes a frame 23, best shown in Fig. 4. This frame is constructed from a rectangular bar of metal which is bent to provide a front transverse frame member 24, two longitudinally extending lateral frame members 25 and 26 and a rear transverse frame member 27. The ends of the bar from which the frame 23 is constructed are joined as indicated at 28, the joint being formed in the rear frame member 27. Between the two frame members 27 and 24 are placed braces 29 and 30. These braces are provided with spaced parallel reaches 31 and 32 and with angularly disposed portions 33 extending towards the frame members 27 and 24. The extreme ends of these braces are provided with flanges 34 which are riveted or otherwise secured to the frame members 27 and 24. Between the two reaches 31 and 32 of the braces 29 and 30 is disposed a block 35 which is rigidly attached to the said reaches through bolts 36. Block 35 is constructed with a boss 37 which is bored to receive a vertically extended spindle 38. This spindle is rigidly secured in the boss 37 and projects downwardly through an opening in the head 20 which has not been illustrated in the draw-

ings. The spindle 38 is constructed at suitable intervals with drilled openings 39 which are adapted to receive a set screw 40 threaded into the head 20. By means of this construction the elevation of the seat 12 of the chair may be adjusted to suit the occupant.

The seat 12 may be constructed in any suitable manner. If desired the same can be constructed of a single piece of wood or some other suitable material, or the seat may be formed with a wood backing which can be upholstered in the customary manner. The seat 12 is of dimensions slightly larger than the frame 23 so that when the seat is placed above the frame the edges of the seat, which are rounded, overhang the frame and cover the same, thereby preventing the user's clothing from being caught in the frame and at the same time providing a neat and attractive construction. The seat 12 is pivoted near its forward edge 41 to the front transverse frame member 24. For this purpose two hinges 42 and 43 are employed, which hinges have one leaf riveted to the frame member 24 and the other leaf attached to the bottom of the seat through screws 44. The seat proper is slightly raised at its forward edge 41 above the upper edge of the transverse frame member 24, as shown in Figs. 2 and 3, so that the seat may swing about the hinges 42 and 43 to perform its intended function.

For the purpose of supporting the back rest 13, a supporting structure 50 is employed which is preferably constructed from a single bar of metal of rectangular cross section similar to the metal from which the frame 23 is constructed. This bar is constructed with two uprights 45 and 46 which are bent to provide curved rear portions 47 which clear the frame member 27 of the frame when the uprights are in position and which also clear the rear edge of the seat 12. Near the upper ends of the uprights 45 and 46 the same are provided with quarter twists 48 and at the same locality said uprights are offset to provide portions 49 by means of which the back rest 13 is attached to the supporting structure 50. The extreme ends of the uprights 45 and 46 are connected together through an integral tie member 51 which is bent from the single bar from which the entire back rest supporting structure is formed and which is adapted to extend parallel with the back rest proper. The uprights 45 and 46 are further bent to provide horizontally extending portions 52 which have riveted to them a transversely extending cross bar 53. This bar is provided at its extreme ends with upturned ears 54 which are pivoted to the longitudinally extending frame members 25 and 26 of frame 23 through rivets 55. By means of this construction the uprights 45 and 46 are pivoted for swinging movement so that the back rest 13 may travel in a back and forth direction between its limits of movement shown in Figs. 2 and 3.

The back rest 13 may be constructed in any suitable manner, the same as the seat 12. If desired a solid block of wood may be used or a backing employed which may be upholstered the same as the seat 12. Inasmuch as the construction of the back rest forms no particular feature of the invention the same has not been shown in detail in the drawings. Said back rest is however provided at its ends with suitable material, such as wood or the like, through which the back rest may be attached to the supporting structure 50. For attaching the back rest to the uprights 45 and 46 two brackets 56 are employed which are constructed at their ends with offset portions 57 and 58. These brackets are best shown in Figs. 1, 5 and 6. The offset portions 58 are drilled as designated at 59 to receive screws 61 which are screwed into the wood of the back rest 13 at the ends thereof. If desired, washers 62 may be placed between the back rest and the offset portions 58. The drilled holes 59 are sufficiently loose and the screws are tightened only to such an extent that the back rest may be turned about said screws as pivots and so that sufficient friction exists to cause the back rest to remain in any desired adjusted position.

The portions 49 of the uprights 45 and 46 are provided with slots 63. The offset portions 57 of the brackets 56 are provided with holes 64. These parts are held together through bolts 65 which pass jointly through the said slots and holes and clamp the parts together. The bolts 65 have wing nuts 66 applied to the ends thereof by means of which the said brackets may be easily and quickly adjusted. The brackets 56 are rotatable upon the bolts 65 with respect to the uprights 45 and 46. For the purpose of holding the said brackets in proper adjusted position the said brackets are constructed with a number of steel balls 67 which are embedded into the metal of the offset portions 57 of said brackets and which are adapted to engage any of a number of depressions 68 formed in the portions 49 of the uprights 45 and 46. In the drawings I have shown each of the brackets as provided with six balls which permits of arranging the depressions 68 in two rows parallel with the slot 63. The outer balls all extend along the said rows of depressions while the center balls extend along the slot 63. By means of this construction added vertical adjustment can be procured by swinging the brackets 56 as well as by raising and lowering the same along slot 63.

For the purpose of swinging the back rest 13 in a back and forth direction through the action of seat 12 the portions 52 of uprights 45 and 46 are constructed with arms 71 and 72 which lie in continuation of said portions 52 and which extend beneath the seat 12. These arms are constructed near their ends with cam portions 73 which are adapted to engage shoes 74 secured to the under side of the seat 12. When pressure is applied to the seat as through the weight of the occupant thereon, the shoes 74 engage the cam portion 73 and swing the arms 71 and 72 downwardly. This has the effect of swinging the uprights 45 and 46 about the pivots formed through the rivets 55 moving the back rest 13 forwardly.

The back rest 13 and the seat 12 are returned to normal position, as shown in Fig. 2, through two leaf springs 75 and 76 which extend beneath the seat proper and which are attached to the frame 23. The ends of these leaf springs engage fingers 77 on the ends of the arms 71 and 72 and serve to force the said arms upwardly, thereby lifting the seat 12 and swinging the back rest 13 rearwardly. Springs 75 and 76 are attached to brackets 78 which are angular in construction and which are riveted to the longitudinally extending frame members 25 and 26 of the frame 23. The exact construction and the method of mounting the said springs is best shown in Figs. 2, 3 and 4.

For the purpose of holding the parts together, the shoes 74 are constructed channel shaped and are formed with flanges 79 at the edges thereof. The cam portions 73 of arms 71 and 72 lie in between these flanges which serve to restrain

lateral movement of the seat relative to the supporting structure for the back rest. A pin 81 extending through the flanges 79 engages beneath the cam portion 73 and holds the said cam portion in close proximity to the engaging surface of the shoes 74. The cam portion 73 is of such length that radial movement of the said cam with respect to the axis of the hinges 42 and 43 is compensated for so that the parts may swing in the desired manner without limitation.

To support the seat 12 in its lowermost position two clip angles 82 are employed which are riveted to the rear frame member 27 and project inwardly of the frame. These clip angles are arranged with their free flange 83 disposed slightly above the plane of the upper edge of the frame 23 so that when the seat is in its lowermost position, as shown in Fig. 3, the said seat rests directly upon said clip angles. Movement of the back rest 13 in a rearward direction is limited through pins 84 which are attached to the longitudinally extending frame members 26 and which are engaged by the arms 71 and 72.

The operation of the invention is as follows. When the parts are in normal position the springs 75 urge the fingers 77 upwardly, which causes the two uprights 45 and 46 and back rest 13 to occupy a rearward position. When the occupant seats himself upon the seat 12, the weight of the occupant causes the seat to swing about the axis of the two hinges 42 and 43, the said seat moving downwardly towards its position shown in Fig. 3. This causes the shoes 74 to bear upon the two cam portions 73 of arms 71 and 72, which swings the said arms downwardly and moves the two uprights 45 and 46 together with the back rest 13 carried thereby forwardly. Movement of the back rest in a forward direction continues until the back rest engages the back of the occupant, whereupon further movement of the said back rest is terminated. Due to the action of the weight of the occupant upon the seat 12, a constant pressure is exerted upon uprights 45 and 46 which maintains the back rest 13 at all times in engagement with the back of the occupant. By the selection of the proper length of the arms 71 and 72 and the proper distance from the hinges 42 and 43 of the shoes 74, the chair may be so designed that when the occupant is seated upon the chair any desired amount of pressure may be exerted by the back rest against the back of the occupant. It will be noted that arms 71 and 72 are relatively short so that but a very small movement of the seat 12 is required to procure full movement of the back rest 13. If during the seating of the occupant the position of the occupant is changed, then the back rest 13 is automatically repositioned to accommodate the new position of the occupant. In this manner the back rest is at all times functioning in the proper manner to engage the back of the occupant with the desired degree of pressure.

My invention is highly advantageous in that an extremely simple and practical device is provided by means of which the back rest is caused to engage the back of the occupant at all positions of the occupant upon the chair. The forward movement of the back rest is terminated through engagement of the back rest with the back of the occupant. In my invention a certain amount of pressure is at all times exerted through the back rest upon the back of the occupant, thereby rendering it unnecessary for the occupant to adjust himself with respect to the chair. The angular movement of the seat is so slight as to not appreciably vary the position of the seat so that the difference in angularity of the seat is not noticeable to the occupant. My invention is entirely automatic in operation and after the back rest has been adjusted for height, will require no further attention. The invention is extremely simple and will not readily get out of order. With my invention a minimum number of adjustments are required.

Changes in the specific form of my invention as herein disclosed may be made within the scope of what is claimed without departing from the spirit of my invention.

Having described my invention what I claim as new and desire to protect by Letters Patent is:

1. In a chair, a frame, an upright pivoted to said frame, a back rest carried by said upright and swingable in a back and forth direction, a seat pivoted at its forward edge to said frame and swingable in an up and down direction, an arm movable with said upright and extending in a forward direction beneath said seat, means on the underside of said seat for engagement with the upper surface of said arm, said seat causing back and forth movement of said back rest through movement of said arm, and a spring secured to said frame and engaging said arm, said spring urging said arm upwardly into engagement with the cooperating means on the underside of the seat.

2. In a chair, a frame, a back rest carried by the frame and movable in a back and forth direction, a seat carried by said frame and guided for up and down movement, and means operated by downward movement of said seat for swinging the back rest forwardly.

3. In a chair, a frame, a back rest carried by the frame and movable in a back and forth direction, a seat carried by said frame and guided for up and down movement, and means operated by downward movement of the rear portion of said seat for swinging said back rest forwardly.

4. In a chair, a frame, an upright pivoted to said frame, a back rest carried by said upright and swingable in a back and forth direction, a seat pivoted at its forward edge to said frame and swingable in an up and down direction, an arm rigid with said upright and extending forwardly of the pivot connecting said upright to the frame and projecting beneath said seat, means on said seat in engagement with said arm whereby downward movement of said seat will procure forward movement of said back rest, and resilient means on said frame in engagement with a portion of said arm and operative to move said arm upwardly thereby raising said seat and swinging said back rest rearwardly.

5. In a chair, a frame, an upright pivoted to said frame, a back rest carried by said upright and swingable in a back and forth direction, a seat pivoted at its forward edge to said frame and swingable in an up and down direction, an arm fixed relative to said upright and extending forwardly of the pivot connecting the upright to the frame and projecting beneath said seat, and means on said seat in engagement with said arm whereby downward movement of said seat will procure forward movement of said back rest.

6. In a chair, a frame, an upright pivoted to said frame, a back rest carried by said upright and swingable in a back and forth direction, a seat pivoted at its forward edge to said frame and swingable in an up and down direction, an arm fixed relative to said upright and extending forwardly of the pivot connecting the upright

to the frame and projecting beneath said seat, means on said seat in engagement with said arm whereby downward movement of said seat will procure forward movement of said back rest, and resilient means carried by said frame for moving said back rest rearwardly.

7. In a chair, a frame, a seat pivoted at its forward edge to said frame, an upright pivoted to the rearward portion of said frame, a back rest carried by said upright, said upright comprising a bar having an arm extending forwardly of the pivot for said upright and beneath said seat, and means on said seat in engagement with said arm.

8. In a chair, a frame, a seat pivoted at its forward edge to said frame, an upright pivoted to the rearward portion of said frame, a back rest carried by said upright, said upright comprising a bar having an arm extending forwardly of the pivot for said upright and beneath said seat, means on said seat in engagement with said arm, and resilient means on said frame in engagement with said arm and urging said arm upwardly.

9. In a chair, a frame, a seat pivoted at its forward edge to said frame, an upright pivoted to the rearward portion of the frame, a back rest carried by said upright, an arm fixed relative to said upright and extending forwardly of the pivot connecting said upright to the frame and projecting beneath said seat, said arm and said upright being swingable together in a vertical plane about said pivot, means on said seat forming a horizontally extending guideway, and means on the forward portion of said arm engaging said guideway, whereby the swinging of said arm and said upright is guided and the seat is moved up and down about its pivot by said arm.

10. In a chair, a rectangular frame comprising front, rear and side frame members, a seat pivoted to said frame in the vicinity of said front frame member, a pair of uprights pivoted to said frame in the vicinity of said rear frame member, a back rest carried by said uprights, arms fixed relative to said uprights and extending forwardly of the rear frame member and along the side frame members, means on said seat in engagement with said arms, and springs on said side frame members and engaging said arms, said springs urging said arms upwardly and operating to move the back rest rearwardly and the seat upwardly.

LEO E. GOENEN.