

Dec. 21, 1948.

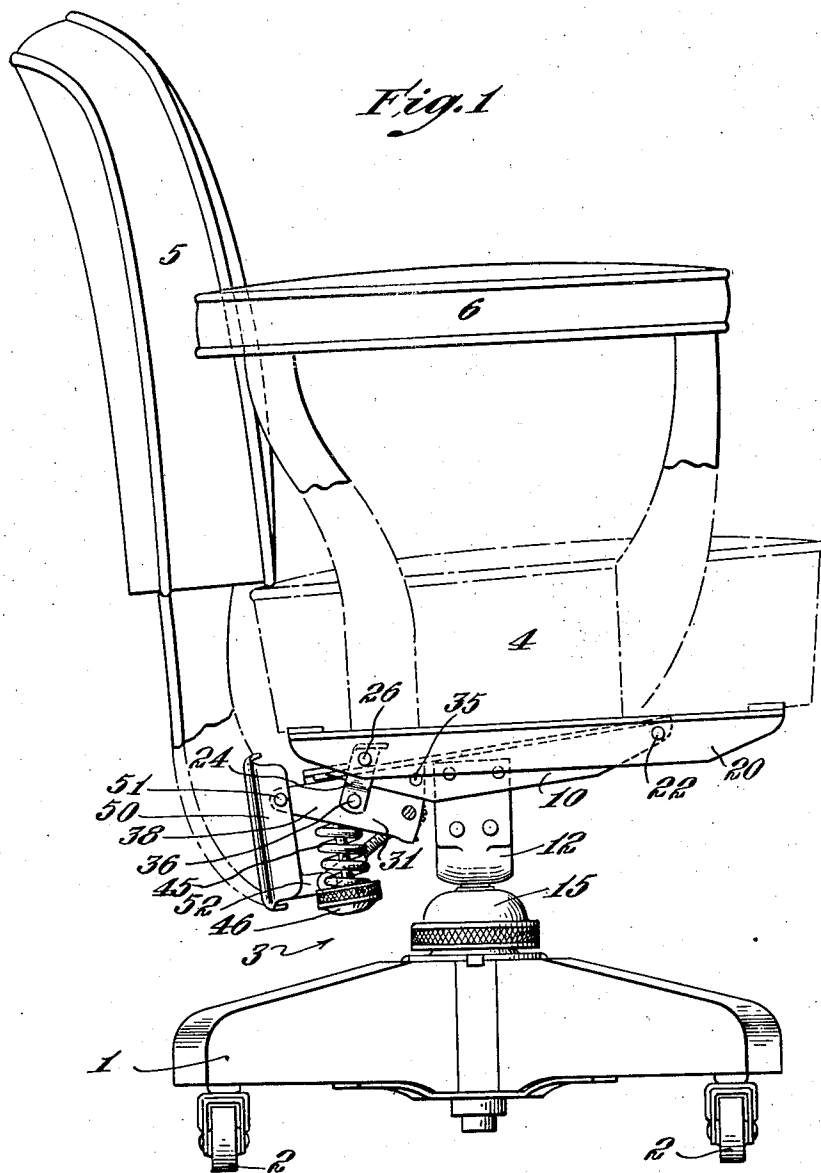
H. W. SHELDRICK

2,456,797

CHAIR IRON FOR TILTABLE SEATS AND BACKS

Filed May 25, 1945

2 Sheets-Sheet 1



Inventor
Henry W. Sheldrick
by Robert Cushman Groves
Att'ys.

Dec. 21, 1948.

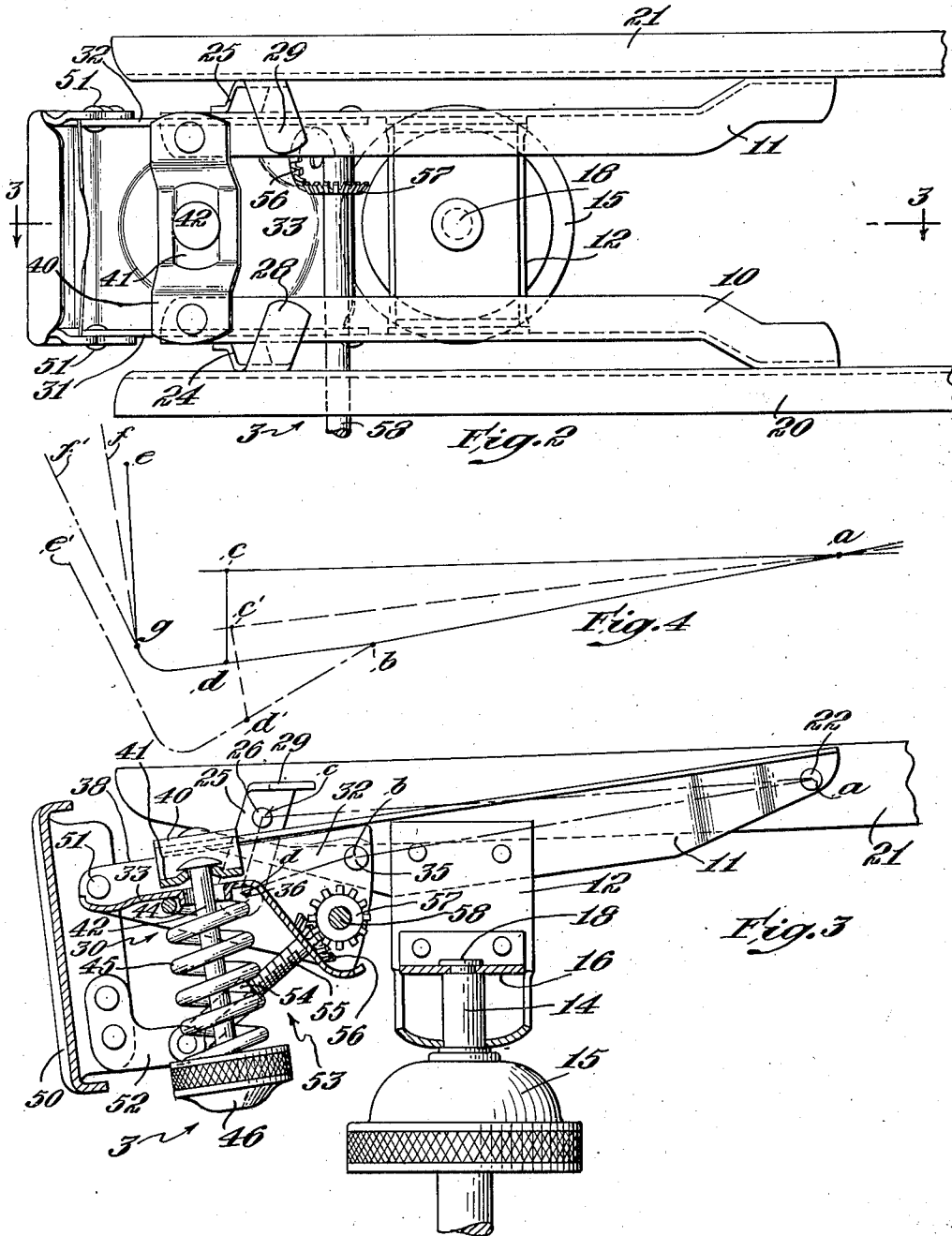
H. W. SHELDRICK

2,456,797

CHAIR IRON FOR TILTABLE SEATS AND BACKS

Filed May 25, 1945

2 Sheets-Sheet 2



Inventor
Henry W. Sheldrick
by Robert, Caushman & Groves
Att'ys.

UNITED STATES PATENT OFFICE

2,456,797

CHAIR IRON FOR TILTABLE SEATS
AND BACKSHenry W. Sheldrick, Gardner, Mass., assignor to
Collier-Keyworth Company, Gardner, Mass., a
corporation of Massachusetts

Application May 25, 1945, Serial No. 595,684

2 Claims. (Cl. 155-77)

1

This invention relates to chairs or the type embodying a pivotally mounted seat and back such, for example, as office chairs and the like.

The principal objects of the invention are to provide an improved chair iron in which the seat and back are supported for simultaneous tipping movement controlled by rearward pressure exerted on the back by the occupant, rather than by the weight or pressure exerted by the occupant on the seat, and to provide a chair iron which is of simple construction, having a minimum number of parts and which may be economically manufactured and readily assembled with a seat, back and pedestal.

Further objects relate to various features and construction and will be apparent from a consideration of the following description and the accompanying drawings, wherein—

Fig. 1 is a side elevation of an office chair embodying the present invention.

Fig. 2 is a top plan view of the chair iron;

Fig. 3 is a section on the line 3—3 of Fig. 2; and

Fig. 4 is a diagrammatic view showing the relative positions of the seat, back and associated members of the chair iron at different angular positions.

In accordance with the present invention I provide a chair comprising a base or the like supporting member which may be of conventional design and construction, separate seat and back members which may also be of conventional design and construction, and a chair iron carried by the base member and supporting both the seat and back for simultaneous tipping movement, the chair iron comprising a four-bar linkage system so designed that the occupant of the chair may control the tipping movement of the seat by exerting pressure on the back. To this end resilient means, such as a compression spring or the like, are provided to act on the linkage system so as to oppose tipping movement of the seat with a substantially greater component of force than the component operative to oppose rearward tipping movement of the back. In addition, I provide means whereby the angular position of the back may be adjusted relative to the seat, thereby securing the desired angular relationship between the seat and back which is more conducive to the comfort of the occupant.

In the embodiment herein shown for the purpose of illustration a conventional pedestal or base 1 is supported on casters 2 and a chair iron 3, carried by the base, supports separate seat and back members 4 and 5. The seat and back

2

members may be of conventional design and construction and, if desired, the seat may be provided with arm rests 6, it being understood that the back rest 5 is supported independently of the seat 4 and arm rests 6, as hereinafter described.

The chair iron 3 comprises a fixed member consisting of a pair of spaced parallel angle irons 10 and 11 rigidly connected at their central portions by a U-shaped member 12 which is rigidly secured to the upper part of a post 14 threaded into and supported by a cap 15 disposed on the top of the pedestal. The fixed member is normally supported in a slightly inclined position, as shown in Figs. 1 and 3, by the U-shaped member 12 and a plate 16 (Fig. 3) is formed with an opening to receive the reduced end of the post 14 which is peened over the margin of the opening, as indicated at 18, to provide a strong and rigid connection between the chair iron and pivot.

Spaced parallel angle irons 20 and 21, collectively constituting a seat-supporting member, are pivotally connected adjacent to their front ends to the corresponding ends of the angle irons 10 and 11, respectively, by rivets 22 or the like pivots, and adjacent to their rear ends, the seat-supporting members 20 and 21 are pivotally connected to depending links 24 and 25 by rivets 26. The upper ends of the links 24 and 25 project beyond the pivots 26 and are bent inwardly to provide stops 28 and 29 engageable with the upper wings of the fixed members 10 and 11 to limit downward tipping movement of the seat-supporting members 20, 21, relative to the fixed members 10 and 11.

The fixed members 10 and 11 are interconnected with links 24 and 25, respectively, through a back-supporting member 30 which consists of a hollow, generally wedge-shaped steel member having side walls 31 and 32 and a depressed bottom wall 33. The side walls 31 and 32 snugly fit between the vertical wings of the fixed members 10 and 11, and are pivotally connected thereto at the upper corners by rivets 35. The lower ends of links 24 and 25 are inwardly offset, as shown in Fig. 2, and are pivotally connected to the central portion of side walls 31 and 32, respectively, by rivets 36. The tapering rear end portion of the member 30 (the parts of the side and bottom walls to the left of pivot 36 in Fig. 1) provides an extension 38 to which the back 5 is connected in the manner hereinafter described.

A transversely extending strap 40 having a depressed central portion 41 is riveted or other-

3

wise secured to the rear ends of the fixed members 10 and 11, and a bolt 42 projects downwardly through openings in the strap and bottom wall 33, the latter being formed with a neck 44 drawn up around the opening therein, as shown in Fig. 3. A helical compression spring 45 is circumposed above the shank of bolt 42 with its upper end acting against the undersurface of the flat wall 33 surrounding the neck 44 which maintains the spring properly centered to prevent rubbing the bolt 42. The lower end of the spring acts against a washer supported by the hub of an adjusting hand wheel 46 threaded on the end of bolt 42. By turning the hand wheel 46 in one direction or the other, its position may be adjusted axially of the bolt so as to vary the force exerted by spring 45 on the fixed members 10, 11 and the back-supporting member 30 in yieldingly opposing downward pivotal movement of the latter about pivot 35.

With this construction and arrangement downwardly tilting movement of the seat 4 of the chair is yieldingly opposed by the spring 45 acting through member 30 and links 24 and 25, and rearward tilting movement of the back 5 is yieldingly opposed by spring 45 acting through extension 38. The design of parts is such that the force necessary to effect downward tilting movement of the seat is many times greater than that necessary to effect rearward tilting movement of the back.

The rear end of extension 38 is pivotally connected to the sides of a U-shaped coupling member 50 to which the back 5 of the chair is adjustably secured, the pivotal connection 51 being spaced from the upper end of the coupling, as shown in Fig. 3. An inwardly extending L-shaped bracket 52 is riveted to one side of the coupling 50 and the inner end of this bracket is pivotally connected with a link 53 of adjustable length, consisting of a threaded sleeve 54 and stem 55 (Fig. 3). The stem 55 projects through an opening in the wall 33 of the member 30 and its inner end carries a bevelled gear 56 which meshes with a bevelled gear 57 fixed to a shaft 58 rotatably mounted in aligned openings in the sides 31 and 32 of the member 30. One end of the shaft 58 extends outwardly and carries a hand wheel (not shown) by means of which the shaft, and hence the stem 55 may be rotated in one direction or the other to vary the effective length of the link 53, which controls the normal angle of inclination of the back 5.

In the construction and arrangement above described the fixed members 10 and 11, the seat-supporting members 20 and 21, the links 24 and 25, and the back-supporting member 30 constitute a four-bar linkage system, illustrated in Fig. 4, wherein the fixed members, seat-supporting members, links, and back-supporting member are represented by the lines $a-b$, $a-c$, $c-d$, and $b-d$, respectively, and the pivotal connections 22, 35, 26 and 36 are respectively represented by the points a , b , c and d ; the line $d-g$ represents the extension 38; the line $e-g$ represents the back 5 of the chair; and angle fge is constructed equal to angle cac' , and line $f'g$ is parallel to the upper extension of line $bd'e'$ to correspond to the position of the seat 5 and associated parts when tilted from normal position, indicated by the full lines.

When the back member of the chair, represented by line $e-g$, is tilted toward the rear, at the same time the seat is lowered from the position $a-c$ to $a-c'$. The back has an angular

4

travel equal to egf' , and due to the fact that angle egf' is greater than angle egf by an amount equal to angle fgf' , the occupant of the chair can force the seat down at will by exerting pressure against the back. This is an essential characteristic in order that the chair iron mechanism can be used by people of varying weight without having to make individual adjustments for each occupant of the chair. When rearward pressure is applied by the occupant to the back member $e-g-d-b$, which is pivoted to the fixed member $a-b$ at b , link $d-c$ is drawn downwardly, causing seat $a-c$ to be lowered to a more inclined position as it pivots on the fixed member $a-b$ at a . Since the moment arms of the force on the back, being the distance from the point on the back where the force is applied to the pivot point b and being greater than the moment arm $b-d$ of the force on the seat, less pressure on the back is needed to compress spring 45 than weight on the seat, and hence the unique arrangement of the members thus permits the occupant of the seat, irrespective of his weight, to control the tilting action merely by applying pressure to the back of the seat, rather than by the weight or pressure exerted by the occupant on the seat as in conventional constructions.

While I have shown and described one desirable embodiment of the invention, it is to be understood that this disclosure is for the purpose of illustration and that various changes in shape, proportion and arrangement of parts, as well as the substitutes and equivalent elements for those herein shown and described, may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. In a chair of the type having separate seat and back members, a chair iron for supporting the seat and back members for simultaneous tipping movement, comprising a fixed member, a seat-supporting member pivotally connected to said fixed member adjacent to one end, a back-supporting member pivotally connected to said fixed member adjacent to its opposite end, a link pivotally connected to said seat-supporting member and to said back-supporting member, the upper end of said link having a stop engageable with said fixed member for limiting the downward tipping movement of said seat-supporting member relative to said fixed member, and resilient means constructed and arranged to react against said fixed member and said back-supporting member so as to oppose downward tipping movement of the seat member with a greater force than the force opposing rearward tipping movement of said back member.

2. In a chair of the type having separate seat and back members, a chair iron for supporting the seat and back members for simultaneous tipping movement, comprising a fixed member, a seat-supporting member pivotally connected to said fixed member adjacent to its front end, a back-supporting member pivotally connected to said fixed member at a point spaced inwardly of the rear end of said fixed member so as to define a rearward projection, said back-supporting member having a rearward extension connected to said back member, a link pivotally connected to said seat-supporting member and to said back-supporting member at a point adjacent to the inner end of said extension, the upper end of said link having a stop engageable with said

fixed member for limiting the downward tipping movement of said seat-supporting member relative to said fixed member, and resilient means constructed and arranged to react against said projection and extension so as to oppose downward tipping movement of said seat member with a greater force than the force opposed rearward tipping movement of said back member.

HENRY W. SHELDRIK.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
180,548	Chichester -----	Aug. 1, 1876
730,875	Chichester -----	June 16, 1903
956,949	Dexter -----	May 3, 1910
1,909,018	Sengpiel -----	May 16, 1933
1,986,105	Foote -----	Jan. 1, 1935
2,211,090	Bolens -----	Aug. 13, 1940
2,321,385	Herold -----	June 8, 1943
2,341,124	Sheldrick -----	Feb. 8, 1944
2,374,350	Herold -----	Apr. 24, 1945