



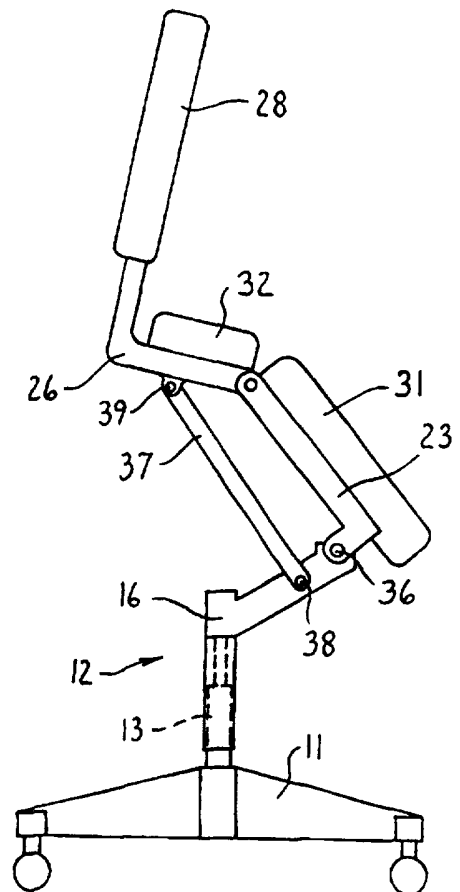
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/US97/10566</p> <p>(22) International Filing Date: 5 June 1997 (05.06.97)</p> <p>(30) Priority Data: 60/019,408 7 June 1996 (07.06.96) US</p> <p>(71) Applicant (for all designated States except US): HAWORTH, INC. [US/US]; One Haworth Center, 1400 Highway M-40, Holland, MI 49423 (US).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): THOLE, Douglas, M. [US/US]; 198 Brookmeadow, Grandville, MI 49418 (US).</p> <p>(74) Agents: THIEL, Dale, H. et al.; Flynn, Thiel, Boutell &amp; Tanis, P.C., 2026 Rambling Road, Kalamazoo, MI 49008-1699 (US).</p>		<p>(81) Designated States: CA, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p><b>Published</b> With international search report.</p>

(54) Title: SIT-STAND CHAIR

## (57) Abstract

An office-type chair (10) having a base (11), an upwardly projecting pedestal (12) containing a height-adjusting gas spring (13) therein, a height-adjustable chair support (16) provided adjacent the upper end of the pedestal, a seat-back arrangement (21), and a forward tilt control linkage connected between the chair support and the seat-back arrangement. The seat-back arrangement includes a seat support structure defined by front (23) and rear (26) seat supports which are horizontally hingedly joined together and which respectively mount thereon front (31) and rear (32) seat members. A control link (37) is pivotally joined between the chair support and at least the rear seat support for permitting the seat to be moved from a normal use position wherein the front and rear seat members are generally horizontally aligned and a forward tilt position wherein the front and rear seat parts are both forwardly tilted.



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## SIT-STAND CHAIR

## FIELD OF THE INVENTION

This invention relates to an office-type chair and, more particularly, to a chair possessing a split seat supported by a control which enables relative forward tilting between front and rear portions of the seat, with the chair also possessing a wholly independent height adjustment capability.

## 10 BACKGROUND OF THE INVENTION

Prior chairs have been developed which possess a split seat so as to permit the front and rear seat portions to be relatively forwardly tilted. Most of the known chairs of this type, however, have utilized the conventional pedestal-mounted gas spring to raise the seat and thus cause relative tilting between the front and rear seat parts. With chairs of this type, independent height adjustment of the seat, particularly when in the conventional horizontal orientation, is not possible.

It is accordingly an object of this invention to provide an improved chair which permits relative forward tilting of the front and rear portions of a seat so that the chair can be used either for sitting or for a semi-sitting or standing position, and which chair in addition possesses a wholly independent height adjusting mechanism so that the seat can be height adjusted independently of the control for the tiltable seat.

Other objects and purposes of the invention will be apparent to persons familiar with chair structures of this general type upon reading the following specification and inspecting the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a diagrammatic side elevational view illustrating a first embodiment of the chair according to

the invention, the chair being illustrated in its normal horizontal sitting position.

Figure 2 is a diagrammatic side elevational view of the chair according to Figure 1 but illustrating the chair in a position wherein the seat has been relatively forwardly tilted.

Figures 3 and 4 are diagrammatic side elevational views which respectively correspond to Figures 1 and 2 but which illustrate a chair according to a second embodiment of the invention.

Figure 5 diagrammatically illustrates a latching or locking device for use in conjunction with the chair.

Certain terminology will be used in the following description for convenience in reference only, and will not be limiting. For example, the words "upwardly", "downwardly", "rightwardly" and "leftwardly" will refer to directions in the drawings to which reference is made. The words "inwardly" and "outwardly" will refer to directions toward and away from, respectively, the geometric center of the chair and designated parts thereof. The word "forwardly" will refer to the forwardly facing direction experienced by an occupant sitting in the chair. Said terminology will include the words specifically mentioned, derivatives thereof, and words of similar import.

#### DETAILED DESCRIPTION

Referring to Figures 1 and 2, there is illustrated a chair 10 according to a first embodiment of the invention.

The chair 10 includes a conventional base 11 having an upwardly projecting pedestal 12 which incorporates a conventional height-adjusting gas spring 13, the latter having a cylinder housing 14 fixed at its lower end to the base, with the cylinder housing having a telescoped upwardly projecting piston rod 15 which at its upper end is joined to a vertically raisable and lowerable chair

control 16. The latter includes a forwardly projecting support arm 17 as an integral and fixed part thereof.

The chair 10 also includes a seat-back assembly 21, a primary portion of which is a seat support structure 22. The latter includes a front seat support 23 which adjacent its rearward end is joined by a transverse horizontal hinge or pivot 24 to the forward end of a rear seat support 26. This latter support 26 adjacent its rearward end is joined to an upright 27 which in turn mounts thereon, in any conventional manner, a back structure 28.

The seat support structure 22, and specifically the front and rear seat supports 23 and 26 respectively, in turn respectively mount thereon front and rear seat members or cushions 31 and 32. When the chair is in the normal use position of Figure 1, the seat members are substantially aligned and hence define a generally horizontally enlarged seat for engagement with the buttocks of an occupant.

In the chair 10 of this invention, the seat support structure 22 and the chair support 16 are joined by an intermediate control linkage 35 which permits relative forward tilting between the front and rear seat members 31 and 32. This control link 35, as indicated by Figures 1 and 2, includes a transverse horizontal hinge or pivot 36 which connects the front of the front seat support 23 to the outer end of the support arm 17, whereby this front horizontal pivot 36 is disposed adjacent and under a front edge of the seat. The control linkage 35 also includes a elongate control arm or link 37 which at a lower front end is joined by a transverse horizontal pivot 38 to the chair control 16, and at its rear upper end is joined by a transverse horizontal pivot 39 to the rear chair support 26 at a location disposed rearwardly from the hinge 24.

The chair 10 illustrated by Figures 1 and 2 will normally be maintained in a typical use position substantially as illustrated by Figure 1, in which position the seat will be defined by the front and rear parts 31 and 32 being generally horizontally aligned so as to define a substantially conventional seat member of generally horizontally enlarged configuration. The chair will be provided with typical stops and controls for releasably maintaining the chair in this typical orientation of Figure 1. Such stops, controls and other related structure are conventional, and are not described or illustrated herein.

Due to the presence of the control linkage 35 which connects the seat support structure 22 to the seat control 16, the split seat 31-32 associated with the chair 10 can be moved into a position illustrated by Figure 2, in which position the front seat member 31 is tilted upwardly so as to be downwardly and forwardly angularly inclined, and the rear seat part 32 is also lifted upwardly and moved forwardly so as to also be in a forwardly but downwardly tilted orientation, although the rear seat member 32 is tilted forwardly and downwardly through a lesser angular extent than is the front seat member 31. The position illustrated by Figure 2, wherein the front and rear seat parts 31-32 are relatively forwardly tilted, is achieved by swinging the seat-back assembly forwardly about the pivot 36 away from the normal use position of Figure 1, and this causes the front seat member 31 to assume a more steeply downwardly inclined slope whereas the rear seat member 32 is forwardly inclined at a lesser slope, and hence an occupant can utilize the chair to provide a generally semi-sitting or semi-standing support.

It will be appreciated that the chair 10 will be provided with typical and conventional latching devices and the like so as to permit the chair to be locked in a

selected forwardly inclined position, such as the position of Figure 2, if desired.

In addition to the relative forward tilt which can be provided with respect to the seat of the chair 10 according to the invention of Figures 1 and 2, it will be appreciated that the height of the chair can also be independently adjusted merely by activating the conventional gas spring 13, thereby effecting vertical raising and lowering of the entire seat-back assembly 21. Such vertical raising and lowering of the seat-back assembly 21 can thus be effected wholly independently of the relative forward tilting capability of the seat.

Referring now to Figures 3 and 4, there is illustrated a second embodiment of a chair according to the present invention.

In the chair 50 of Figures 3 and 4, the chair 50 again includes a base 51 having a generally conventional upwardly projecting central pedestal 52, the latter having a height-adjusting gas spring associated therewith including a cylinder housing 53 which is fixed relative to the base and projects upwardly, and has a vertically extendable piston rod 54 which at its upper end is coupled to a height-adjustable chair support 55. The latter, as in conventional, has a downwardly projecting sleeve part which telescopically surrounds the gas spring.

The chair 50 has a seat-back arrangement 56 which is supported on and interconnected to the chair control 55 through a control linkage 57, as explained hereinafter.

The seat-back arrangement 56 includes a main or rear seat support member 61 which, at its rearward edge, is joined to an upright 62 which in turn mounts thereon, in a conventional manner, a back member 63.

The seat-back arrangement 56 also includes a front seat support 64 which is positioned forwardly of the main seat support 61, and the front seat support 64 is joined

to and positioned adjacent the front edge of the rear seat support 61 by means of a flat spring plate 65 extending and joined therebetween. This spring plate 65 normally resiliently maintains the front seat support 64  
5 in an orientation wherein it is positioned adjacent a front edge of the rear seat support 61 so as to be substantially aligned with the rear support 61.

The seat of the chair includes a rear seat member 66 which is positioned on the main or rear seat support 61,  
10 and also includes a front seat member 67 which is stationarily positioned on the front seat support 66. These seat members 66 and 67 are normally positioned in generally horizontally aligned relation, as illustrated in Figure 3, to thus define a horizontally enlarged seat  
15 for supporting an occupant thereon.

Considering now the control linkage 57, same includes an elongate front support arm or link 71 which is normally oriented as illustrated in Figure 3 and has its upper end connected by a transverse horizontal pivot  
20 72 to the rear seat support 61 adjacent a forward end thereof. The lower end of front link 71 is joined by a further transverse horizontal pivot 73 to the chair support 55 adjacent a front end thereof. A stop 74 is fixed to the chair support 55, and the front control link  
25 or arm 71 will normally bear against the stop 74 to maintain the seat of the chair in the typical horizontal orientation illustrated by Figure 3.

Control linkage 57 also includes a rear elongate control arm or link 76, the latter having its upper end  
30 joined by a transverse horizontal pivot 77 to the rear seat support 61 adjacent the rear end thereof. A further transverse horizontal pivot 78 joins the lower end of rear link 76 to the chair support 55, which pivot 78 is spaced rearwardly a substantial distance from the pivot  
35 73. All of these pivots 72, 73, 77 and 78 are generally



parallel and extend horizontally in generally transverse relation relative to the chair.

With the chair 50 as illustrated by Figures 3 and 4, the front seat member 67 can be independently deflected downwardly into a forward tilt position, such as illustrated in Figure 4, without changing the position or angular orientation of the rear seat member 66. The occupant can, by exerting suitable leg pressure against the front seat member 67, cause it to angularly deflect downwardly into a forward tilt position due to deflection of the spring plate 65.

However, the chair 50 can also be activated into an entire forward tilt position substantially as illustrated by Figure 4 merely by swinging the seat upwardly due to forward pivoting of the control links 71 and 76, thereby causing the rear seat part 66 to swing upwardly and to assume a shallow forward tilt angle. Again, the front seat member 67 can be independently downwardly forwardly tilted relative to the rear seat part 66 if desired.

Since the spring plate 65 continuously resiliently urges the front seat member 67 to return to its generally aligned position with the rear seat member 66, it is preferable to provide a latch or lock to hold the front seat member 67 in a forwardly inclined position to thereby relieve the spring restoring force from the occupant's legs. For this purpose, a latch similar to that illustrated by Figure 5 can be provided.

More specifically, as shown in Figure 5, the front seat support 64 is provided with a connector plate 81 which projects rearwardly and is hingedly supported on the hinge shaft 72 provided under the front edge of the rear seat support 61. The rearward end of the control plate 81, in surrounding relationship to the hinge 72, can be provided with a toothed latch part 82 extending around a portion of the circumference thereof, which latch part 82 is positioned for cooperation and

engagement with a releasable latch 83. The latter is connected to a latch release handle 84 which is pivotal about a transverse horizontal pivot 85 provided on the rear seat support, and a torsion spring 86 normally urges  
5 the latch 83 into latching engagement with the latch sector 82. This latching relationship locks the front seat member 67 in a forwardly tilted or inclined position against the urging of the plate spring 65, and when the latch is manually released, then the operator can either  
10 forwardly incline the front seat part, or permit it to return to its normal aligned relationship with the rear seat part.

The chair 50 of Figures 3 and 4, and as explained above relative to the chair 10 of Figures 1 and 2, will  
15 be provided with typical and conventional stops, latches and the like so as to control the position of the chair when it is moved between the normal and tilted positions illustrated by Figures 3 and 4. Such stops and latches are conventional, and an ordinarily skilled artisan will  
20 recognize how such controls and latches are to be incorporated into the chair, so that further detailed description thereof is believed unnecessary.

The chair 50 of Figures 3 and 4 also incorporates therein a wholly independent height-adjusting mechanism,  
25 namely the gas spring 53-54, and hence the height of the chair can be readily selectively varied without influencing the positional adjustment and more specifically the forward seat tilt adjustment achieved by use and activation of the control linkage 57.

30 Although a particular preferred embodiment of the invention has been disclosed in detail for illustrative purposes, it will be recognized that variations or modifications of the disclosed apparatus, including the rearrangement of parts, lie within the scope of the  
35 present invention.

I/we claim:

1. In an office-type chair having a base, an upwardly projecting pedestal containing a  
5 height-adjusting gas spring therein, a height-adjustable chair support provided adjacent the upper end of the pedestal, a seat-back arrangement, and a forward tilt control linkage connected between said chair support and said seat-back arrangement, comprising the improvement  
10 wherein the seat-back arrangement includes a seat support structure defined by front and rear seat supports which are horizontally hingedly joined together and which respectively mount thereon front and rear seat members, and a control link pivotally joined between said chair  
15 support and at least said rear seat support for permitting said seat to be moved from a normal use position wherein the front and rear seat members are generally horizontally aligned and a forward tilt position wherein the front and rear seat parts are both  
20 forwardly tilted.

2. A chair according to Claim 1, wherein said front seat member is forwardly tilted at a steeper angle than the rear seat member when the seat is in the forward tilt  
25 position.

3. A chair according to Claim 1, wherein the front seat support is joined to the rear seat support by a spring which allows the front seat support to deflect  
30 downwardly and assume a forwardly inclined position relative to the rear seat support in response to application of external load to the front seat member.

FIG. 2

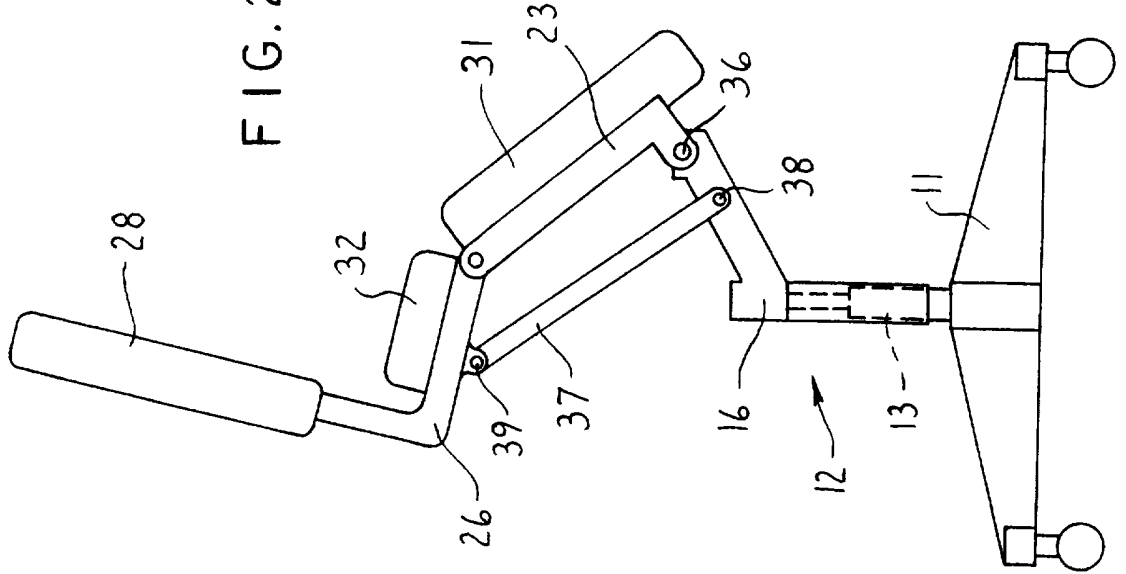
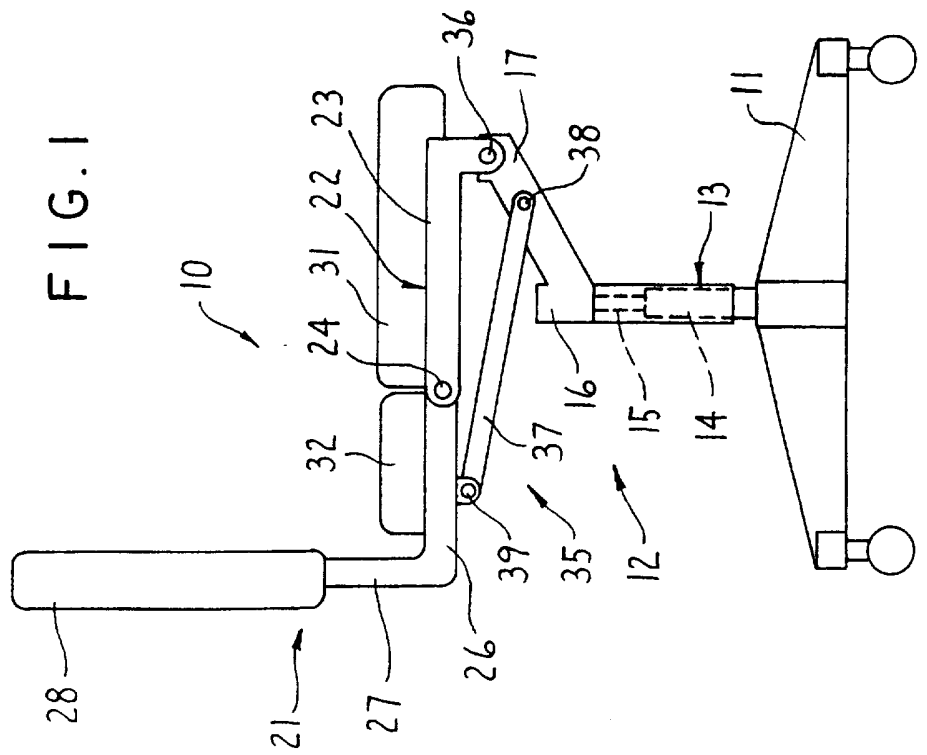


FIG. 1



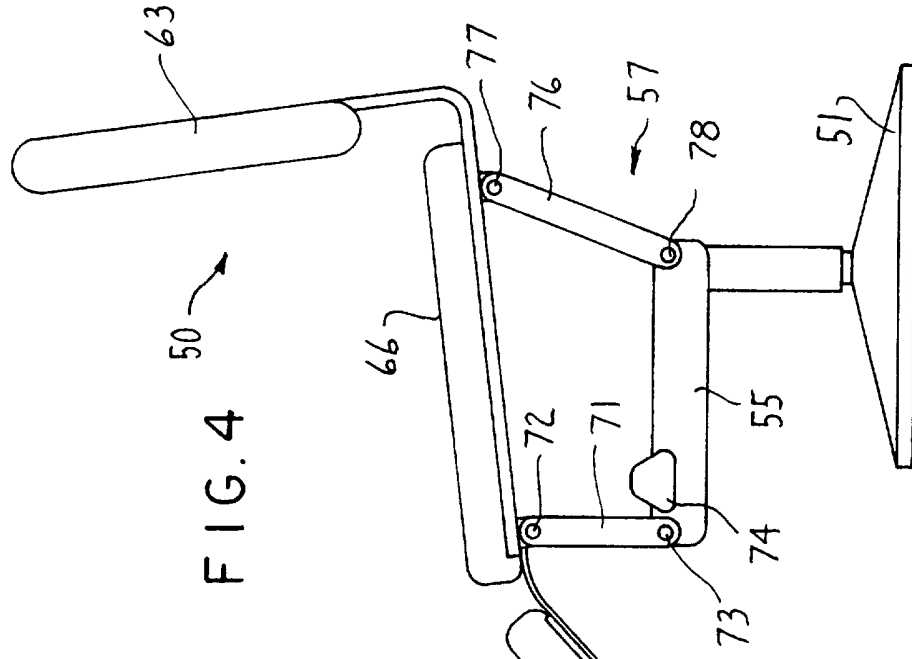


FIG. 4

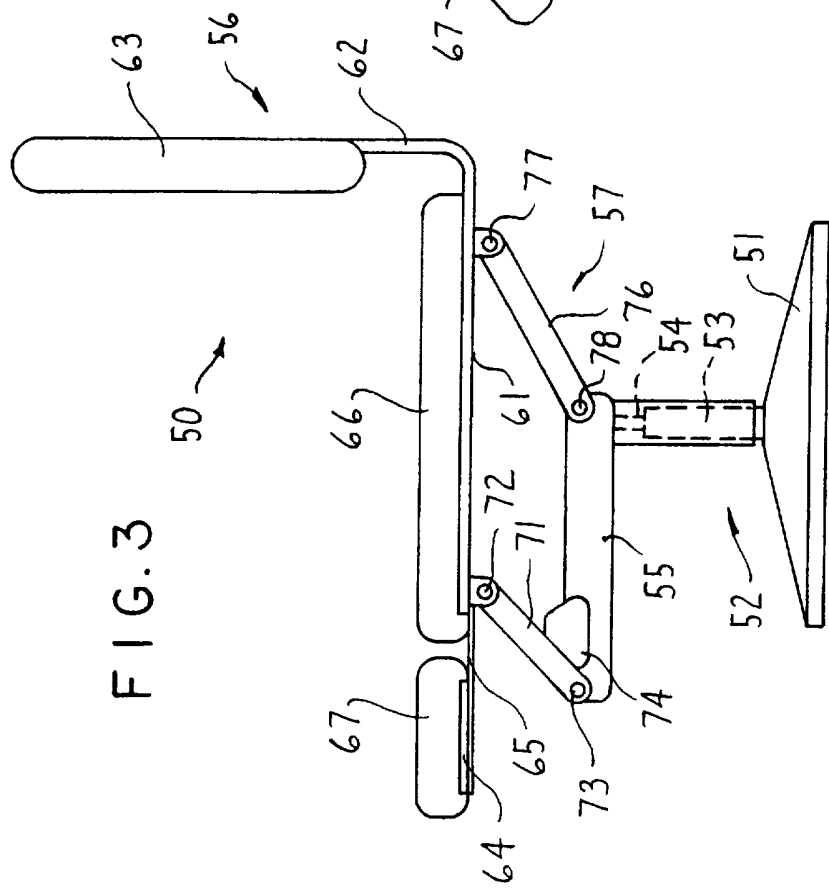
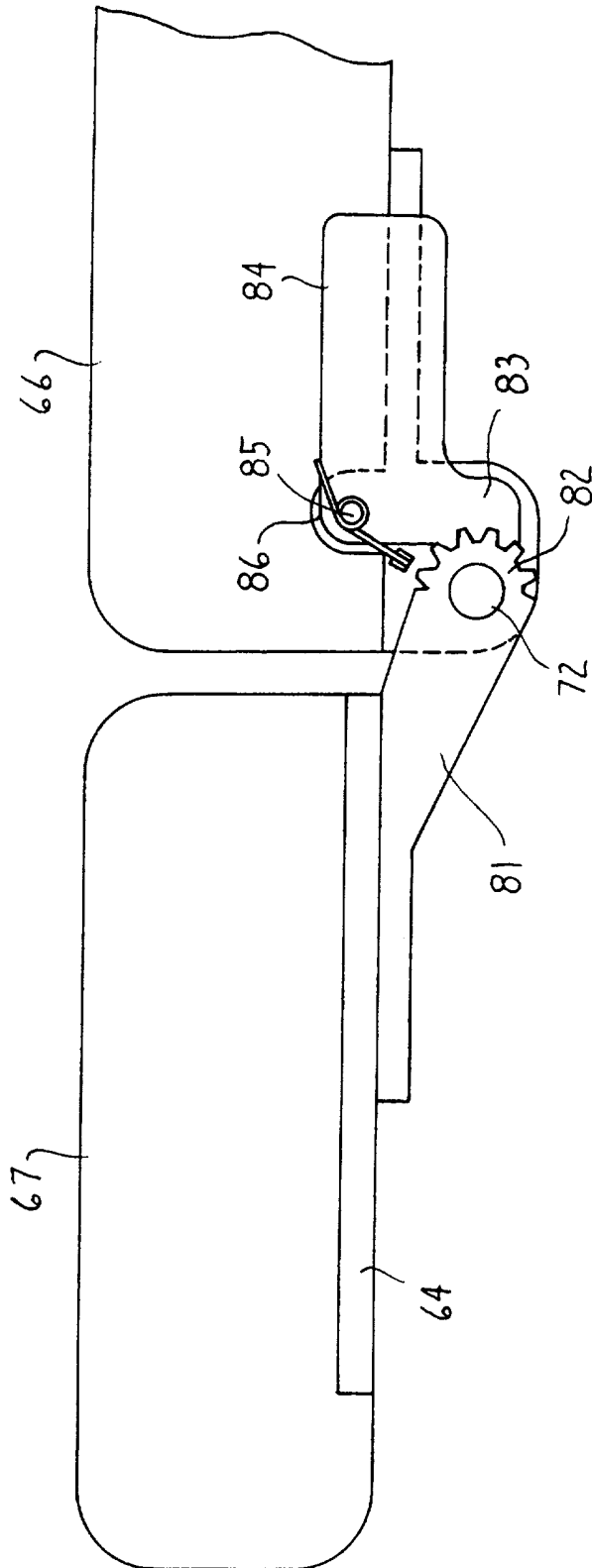


FIG. 3

FIG. 5



## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US97/10566**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) :A47C 1/02

US CL :297/316

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 297/316, 325, 327, 344.16, 344.19, 284.1, 284.3, 284.11.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
NoneElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
None**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3,138,402 A (HEYL, JR. ET AL) 23 June 1964 (23/06/64), see entire document.	1-3
A	US 5,401,077 A (HOSOE) 28 March 1995 (28/03/95), see entire document.	1-3
A	US 5,435,623 A (KAPEC ET AL) 25 July 1995 (25/07/95), see entire document.	1-3
A,P	US 5,536,067 A (PINTO) 16 July 1996 (16/07/96), see entire document.	1-3
A	US 4,765,679 A (LANUZZI ET AL) 23 August 1988 (23/08/88), see entire document.	1-3

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