United States Patent [19]

Bauer

[11] **3,756,654**

[45] **Sept. 4, 1973**

[54] **ARTICLE OF SEATING FURNITURE**

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[30] **Foreign Application Priority Data**

Jan. 31, 1970 Germany ..... P 20 04 372.5

[52] **U.S. Cl.** **297/345**

[51] **Int. Cl.** **A47c 1/02,** A47c 1/06, A47c 1/12

[58] **Field of Search** 297/301, 302, 306, 297/314, 327, 353, 345, 383, 363, 364, 367, 337

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Primary Examiner—Paul R. Gilliam

Attorney—Misegades & Douglas

[57] **ABSTRACT**

A seat having a seat member and a back rest both adjustable to suit the dimensions of the user, latching devices being provided for latching adjustable members in adjusted positions, the latching devices being actuated by a single operating lever positioned for convenient use from a seated position.

6 Claims, 7 Drawing Figures

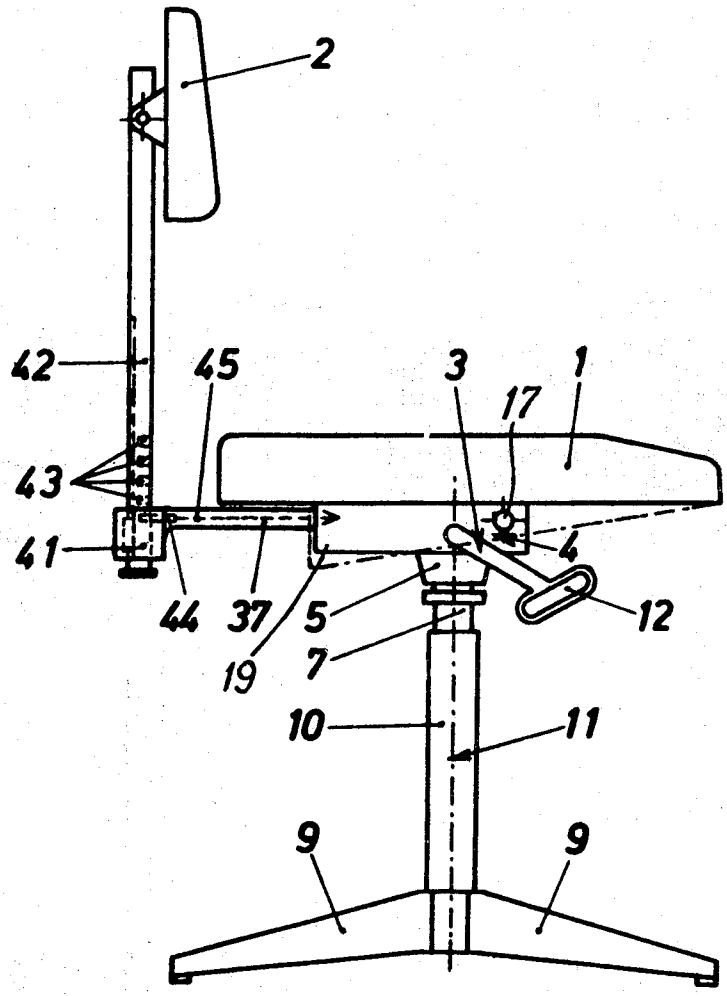


Fig.1

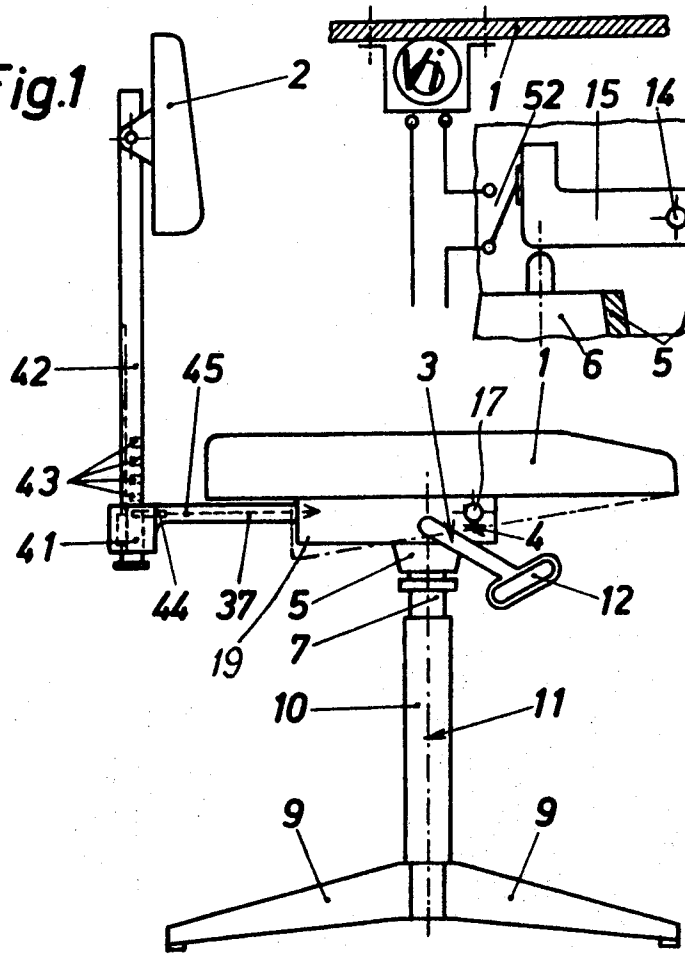


Fig.7

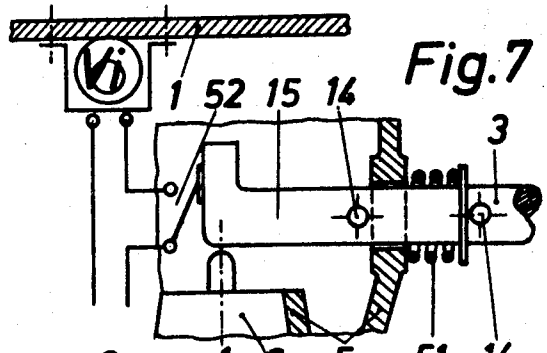


Fig.5

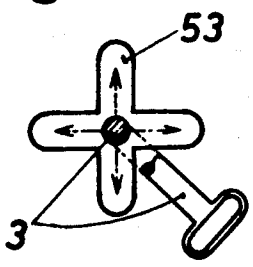


Fig.6

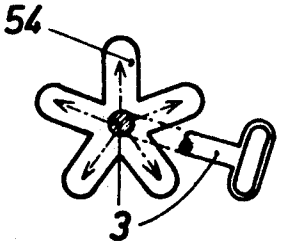


Fig.2

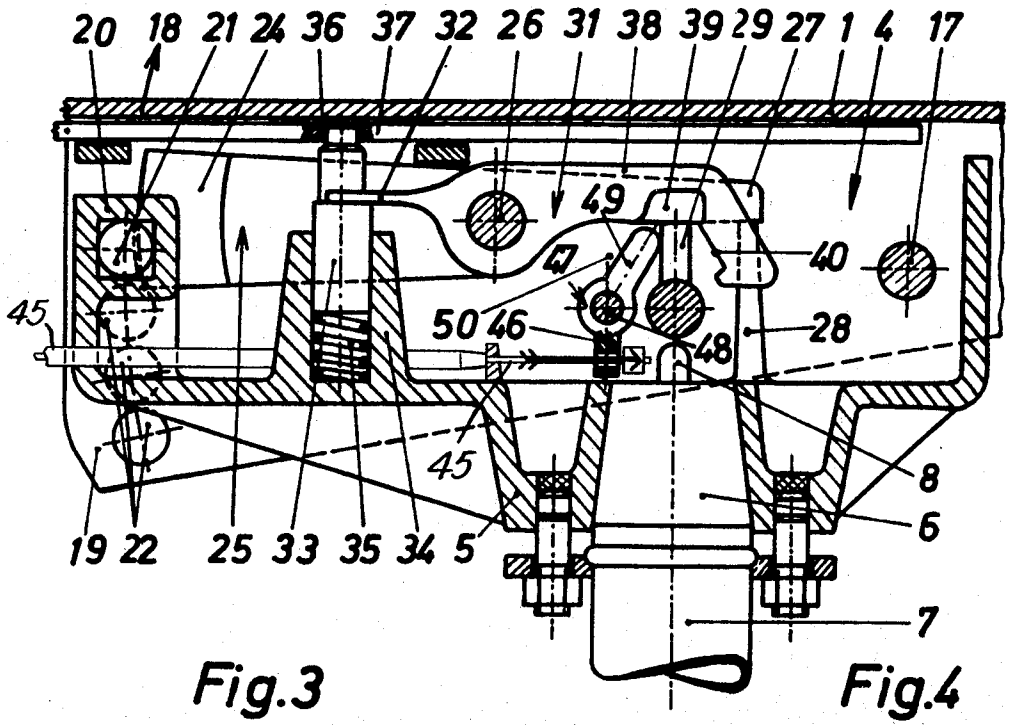


Fig.3

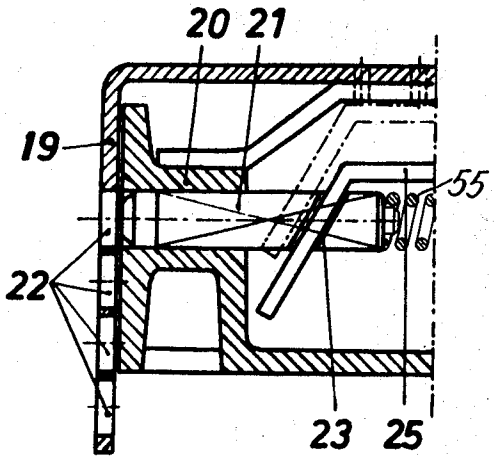
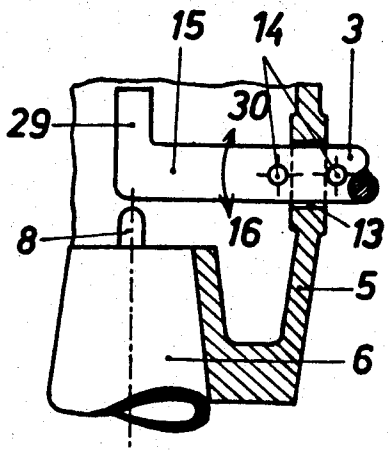


Fig.4



ARTICLE OF SEATING FURNITURE

CROSS-REFERENCES TO COPENDING APPLICATIONS

This application is a copending patent application to Baur patent application, Ser. No. 881,436, now U.S. Pat. No. 3,656,593; and patent application, Ser. No. 47,846, now allowed, and U.S. Pat. No. 3,711,054, which is a continuation-in-part application of U.S. Pat. No. 3,656,593; and claim thereto is made under 35 U.S.C. 120. The disclosure of these applications is incorporated by reference in accordance with the Notice in the Official Gazette of Jan. 27, 1970.

BACKGROUND OF THE INVENTION

The invention relates to an article of seating furniture, more particularly a chair, with a seat and back rest adjustable to the particular body dimensions of the user.

The construction of such chairs, used more particularly in offices, factories or the like, is based on the recognition that the best possible efficiency of a worker is only achievable if he can suitably assume a comfortable and anatomically correct seated position at his workplace. Also, such seating contributes considerably to remaining in health. In order to be able to adapt the seat, more particularly the working chair, to the body dimensions of the user, not only does the seat require to be constructed so as to be adjustable in height, but also its angle of inclination has to be variable and moreover the back rest requires to be constructed so as to be adjustable in its height and depth and in the horizontal direction. Furthermore, such chairs have already been provided with a vibrator, in order to place the seat in vibration and counteract fatigue of the user, by massage.

A chair constructed in this manner is understandably expensive in manufacture since for each possibility of displacement, a separate operating lever, hand grip or the like is provided. The number of operating levers makes it necessary to distribute them and correspondingly arrange them at different places on the chair frame carrying the seat, most of these places being inaccessible by the user, in the seated position. Consequently, frequently the greatest part of the adjustment possibility is not exploited at all. Apart from this, the large number of these operating levers detracts from the shape and the appearance of the chair so that in spite of the existing requirement, mainly only one or two displacement possibilities are provided with such chairs, in order to simplify and accordingly make more economic the manufacture of adjustable chairs.

SUMMARY OF THE INVENTION

Accordingly, the object of the invention is to arrange a known chair, which if desired may also be active against fatigue manifestations, with a seat and back rest adjustable to the individual body dimensions of the user, in such a manner that with a considerably lower structural expense, the adjustment of all variable dimensions or functions of the chair can be comfortably performed, more particularly in the seated position of the user.

This is achieved in an advantageous manner, in that for adjusting the variable dimensions of the back rest and seat, and if desired for switching on an auxiliary vibrator, a single operating lever is provided on the chair

in correct relation to the seated position, which for engaging and releasing the devices locking the adjustable dimensions, is constructed so as to be movable in a cross or star shaped manner, interruptedly rotatable or axially displaceable or the like, and has a bent portion, a projection, extension or the like transferring its movement steps to the device.

In detail, the construction may be such that for height adjustment of the seat which is adjustable in inclination, preferably a pneumatic spring is built into a central vertical tubular base, its release pin extending out of the upper possibly frust-conical end of the pneumatic spring, the said end being rigidly fixed in a housing-like hub carrying the seat, the operating lever being rockably or rotatably mounted or otherwise pivoted in the housing-like hub, with the bent portion extending upwardly and with the oppositely disposed lower side cooperating with the release pin. In the ineffective central position of the operating lever, its bent portion, extension, projection or the like is engaged by one end of a double armed rockable displacing lever the other end of which engages in an inclined guide of a bolt latching the seat against displacement. On the bearing pin for the double armed displacing lever for adjusting the seat inclination, a latching lever constructed like a tumbler is arranged, which cooperates with the bent portion of the actuating lever, in the clockwise direction, its lever arm remote from the said bent region being in engagement with a pin which can be depressed against the action of a spring and which serves for latching the horizontal displacement of the back rest. At the height of the central position of the operating lever, a double armed compensating lever is mounted for cooperating with this in the anti clockwise direction, its one lever arm engaging in an edge recess of the lever latching the horizontal displacement of the back rest and in its rest position lying against the bent portion of the operating lever, its other lever arm being connected by means of a cable, transmission rod or the like, with a pin latching the height adjustment of the back rest. Finally, the end of the axially displaceably constructed operating lever extending into the housing-like hub, may have a normally open contact set, limit switch or the like, for closing the electric current circuit of for example a vibrator provided on the seat.

These measures enable the adjustment of the back rest and seat in relation to the body dimensions of the individual user, to be performed with a few hand actions and more particularly due to the correct arrangement of the single operating lever in relation to the seated position, ensure that use can be made of all of the adjustment possibilities of the chair. The arrangement of the single operating lever not only results in an essentially lower structural expense and consequently an economic manufacture, but also allows an attractive shape of the chair. As a result of the favourable procurement costs in connection with the single lever mechanism which can simply be operated from a correct seated position for a multiplicity of adjustable sizes for adapting the chair to practically any body dimension, in association with a tasteful shape, a chair is provided which not only meets all requirements but which also can be readily adapted to any room furnishing. Accordingly, any working place at a desk or other working table, at a machine and the like can be provided with a chair constructed according to the invention, at a bearable expense, which enables an anatomically cor-

rect seated position and thus can significantly contribute to maintaining the health of the working personnel.

DESCRIPTION OF THE DRAWINGS

In order to make the invention clearly understood, reference will now be made to the accompanying drawings which are given by way of example and in which:

FIG. 1 is a side elevation of an article of seating furniture constructed as a chair with a tubular base, having a housing-like hub arranged at the underside of the seat shell;

FIG. 2 is a section through the housing-like hub fixed onto the tubular base or a pneumatic spring;

FIG. 3 is a section through the partially illustrated latching device for the inclination of the seat shell or seat surface;

FIG. 4 is a section through the partially illustrated mounting of the operating lever;

FIG. 5 is a plan view showing an actuating diagram for the operating lever;

FIG. 6 is a plan view showing a further actuating diagram; and

FIG. 7 is a fragmentary sectional view showing the arrangement of a vibrator.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As an embodiment of an article of seating furniture, a working chair has been selected, its seat or seat shell **1** being constructed so as to be adjustable in height and also in inclination. Moreover, the chair is provided with a back rest **2** which should be adjustable horizontally or parallel to the seat shell and also in its height or perpendicularly to the seat shell. Also, the seat may be provided with a vibrator (see FIG. 7) which when required is switched on for a more or less short time for combatting fatigue manifestations. These five functions should according to the invention be comfortably initiated from a correct seated position, by means of a single operating lever **3.**

Below the seat shell **1,** a housing-like hub **4** is provided, in which the devices which are actuatable by the operating lever **3,** and which are required for the individual functions of the chair are provided. The housing-like hub **4** is connected by means of a member **5** with a frusto-conically shaped head end **6** of a pneumatic spring **7** which has a release pin **8** extending through the frusto-conically shaped head end. The pneumatic spring **7** is mounted in a guide tube **10** provided at its lower end with support arms **9,** and is rotatably mounted with the free end of its piston rod (not shown) in the bottom of the guide tube. For up or down adjustment of the seat shell or seat **1,** the release pin **8** is depressed, whereby a blocking device is open so that the pressure gas can flow through a throttle region from the housing chamber in front of the working piston into the housing chamber behind the working piston, or vice versa. The housing of the pneumatic spring and therewith the hub **4** with the seat shell, can thus be displaced up or down until the blocking device is again closed by releasing the release pin **8,** the adjusted seat being locked in the new position. The construction of the pneumatic spring **7** and its rotatable arrangement in the tubular base which is designated in its entirety by refernece numeral **11** is the subject of Baur U.S. Pat. No. 3,656,593 and Baur U.S. Pat. (Ser. No. 47,846) 3,711,054 (now allowed by Group Art Unit 351). Thus it is shown and apparent that the pneumatic spring is developed as a pneumatic or hydro-pneumatic lifting arrangement and not as a purely pneumatic lifting arrangement. This is clearly shown in FIG. 1 of Baur U.S. Pat. No. 3,711,054 (Ser. No. 47,846).

The operating lever **3,** provided if desired with a handle **12,** serves for depressing the release pin **8.** The lever **3** is mounted in an opening **13** of the wall of the housing-like hub **4,** by means of two transverse pins **14** which between them embrace the wall of the housing-like hub **4** with play and is limitedly rockable in all directions and rotatable, so that two lever arms are formed. The operating lever terminates in its ineffective central position in the interior of the hub, with slight play directly above the release pin **8.** If the operating lever **3** is swung upwardly outside at the handle **12,** then the inner lever arm **15** presses the release pin downwardly in the direction of the arrow **16,** whereby the already explained height adjustment of the seat shell **1** can be performed.

FOR INCLINATION ADJUSTMENT OF BACK SUPPORT 42,2

The seat shell or seat **1** which is mounted so as to be swingable about a shaft **17** of the housing-like hub **4** in the sitting direction or in the direction of the arrow **18,** can be adjusted into a desired inclination and latched in this adjusted position. For this, the seat shell may for example be provided with a side piece **19** such as shown in FIG. **1,** in chain dotted lines and in FIG. **2** in full lines. In a bearing **20** in the housing-like hub **4,** a pin **21** is axially displaceably mounted which can be disengaged against the action of a spring **55,** the pin engaging in a corresponding aperture **22** of the side piece **19** under the action of this spring, for latching the adjusted seat shell inclination. The latching pin **21** which for example is circular in cross section only at the head end but otherwise is for example square in cross section, has at the region of its inner end, an inclined guide **23** in one side, in which the adjacent and similarly inclined end **24,** which can be swung up and down, of a two armed displacing lever **25** engages. The latter is rockably mounted on a pivot axle **26** of the housing-like hub **4** and lies with its other end **27** on a support **28,** in the latching position of the pin **21.** Under this lever end, in the central or rest position of the operating lever **3,** an extension or bent portion **29** or the like of the operating lever, which extends upwardly relative to the release pin **8,** terminates. If the lever **3** is swung downwardly at the hand grip **12** then the bent portion **29** is swung upwardly in the direction of the arrow **30** and lifts the end **27** of the displacing lever **25,** whereupon by means of the downwardly swung inclined end **24** in the inclined guide **23,** the latching pin is drawn back or disengaged, see FIG. **3.**

FOR HORIZONTAL ADJUSTMENT OF BACK SUPPORT 42,2

A further double armed latching lever **31** is rockably mounted on the pivot axle **26.** The lever arm **32** remote from the bent portion **29** is formed at its free end as a fork which rests on the annular surface of a stepped pin **33.** This is vertically guided in a bearing **34** and can be depressed against the action of a compression spring **35.** Under the action of this compression spring, the narrow end engages in an aperture **36** of the horizontally extending part of a carrying bar **37,** which may be

in the form of a tube or the like, of the back rest **2**. The second lever arm **38** is constructed in the manner of a tumbler of a door lock. If the operating lever **3** is rotated in an anti-clockwise direction then the swinging movement remains without influence on the latching lever **31**. This is also the case if the bent portion **29** is swung upwardly in order to lift the lever arm **27** of the displacing lever **25**, since at the underside of the second lever arm **38** an edge recess **39** which receives the upwardly swung bent portion is provided. If however the operating lever **3** is rotated in the clockwise direction then the bent portion **29** presses against an inclined surface **40** of the second lever arm **38** and swings this upwardly. Thereby, by means of the fork of the other lever arm, the stepped pin **33** is depressed and its free end is withdrawn from the aperture **36** of the carrying rod **37**. This carrying rod **37** is thus released and can be pushed to and fro relative to the seat shell **1** according to requirements, depending on which position is desired for the back rest **2**.

FOR VERTICAL ADJUSTMENT OF BACK SUPPORT 42,2

At the same time, also the back rest **2** may be constructed so as to be adjustable in height. For this, the horizontally displaceable carrying rod **37**, which if desired is constructed as a tube, comprises at its end disposed outside the housing-like hub **4**, for example a sleeve **41** with a vertically extending axis, in which a further carrying rod, a bar, or a tube **42** or the like is guided so as to be slidable axially up and down but non-rotatable. At the upper end of this tube **42**, the back rest **2** is mounted so as to be rockable by engagement of itself on the back of the user. The actual or desired height of the back rest is adjusted by sliding the tube **42** in the sleeve **41** and latched for example by a transverse pin **44** guided in the sleeve and engaging in a corresponding aperture **41** of the tube, rod or the like. This transverse pin **44** may be under the action of a spring, not illustrated, which tends to press it against the vertically extending tube and thus into the respectively allocated openings **43**. At the outer end, the transverse pin **44** may be connected with one end of a cable, rod **45** or the like, illustrated only diagrammatically in FIG. **1**, the other end of which is connected to the lower lever arm **46**, which is vertical in the rest position, of a double armed compensating lever **47**. This compensating lever **47** is rockably mounted on an axle **48** for example at the height of the ineffective central position of the operating lever **3**, and bears with the free end of its second lever arm **49** on the bent portion **29** of the operating lever **3**. It extends into an edge recess **50** of the latching lever **31** so that on rotating the handle **12** of the operating lever **3** in the anti-clockwise direction, the bent portion **29** can displace the compensating lever **47** without actuating the latching lever **31** and the displacing lever **25**. Thus, by means of the vertical lever arm **46**, through the cable, rod **45** or the like, the transverse pin **44** can be withdrawn from the vertical tube **42** or bar or the like carrying the back rest **2**, so that the back rest can be adjusted to the desired height, at which the transverse pin **44** of the sleeve **41** then engages in the adjacent opening **43** of the tube **42**.

The operating lever **3** may be mounted in the wall of the housing-like hub **4** so that additionally it can be slidably displaced axially into the interior of the hub, against the action of a spring. For this, the spacing for example of the outer transverse pin **14** from the hub wall is increased and a compression spring **51** provided between this transverse pin of the operating lever and the wall. At the end extending into the housing-like hub **4**, a switch **52** may be arranged which on axial sliding of the operating lever, closes an electric current circuit of a vibrator V*i*, see FIG. **7**. The latter may for example be provided below the seat shell or the seat **1** in order to act against fatigue of the user of the chair. In this respect the current circuit remains closed until the operating lever is again returned into its ineffective central position.

For releasing the various functions of the working chair, the single operating lever may also be so constructed and moved that it is operable like the gear shift lever of a motor vehicle. FIG. **5** shows a cross shaped actuating diagram according to which the operating lever **3** is guided in two perpendicularly crossing slots **53** in a side wall of the housing-like hub **4**. In FIG. **6**, the slots **54** which are only half as long, are arranged in a star shape. Of course, the individual devices for the different functions of the working chair must in this case be so arranged and constructed that in accordance with the radially extending rocking movements of the operating lever, the different adjustments and latchings are enabled. It is not necessary that each working chair is fitted with four and more adjustment possibilities. Fewer, e.g. even only two may be provided. It is only essential that the adjustment possibilities which are provided, can be performed by means of an operating lever correctly situated in relation to the seated position and which instead of a bent portion may alternatively be effective for acting on the devices releasing the individual functions of the chair, by means of an extension or alternatively in other manners.

I claim:

1. Seating furniture for use with a pneumatic spring means comprising a single operating lever (**3**) having its fixed end (**29**) extending within a housing (**4**), a seat member (**1**) mounted above and supported by said housing, said housing (**4**) having a recess for resting upon an upper end (**6**) of a generally frusto-conically shaped head extending from a base (**7,11**), said housing including means for vertical adjustment of a back support (**42,2**) operable by twisting of the operating lever (**3**) to actuate a lever (**49**) to stress a cable (**45**) under bias to displace pin means (**44**) from an apertured vertical means (**42**) of said back support, and means for horizontal adjustment of the back support (**42,2**) operable by turning the lever (**3**) to actuate a lever arm (**38**) to depress a biased means (**33**) to release an apertured horizontal carrying bar (**37**) connected to said back support, said adjustment means being directly functional by the operating lever, and means for inclination adjustment of the back support by turning the lever (**3**) to actuate lever member (**27,25,23**) to cooperate with manually depressable pin means (**21**) selectively engaging one of several apertures (**22**).

2. Seating furniture according to claim **1**, wherein an inside lever arm (**15**) of the operating lever (**3**) cooperating with the release pin (**8**) and extending into the housing (**4**), has on its free end a continuation (**29**) directed upwards in an inoperative middle position on which rests the one end (**27**) of a two-armed shifting lever (**25**) and being swivelable around an axis (**26**) for the adjustment of the inclination of the seat member, the other end (**24**) of which extending away from the

swiveling axle (17) of the seat member (1) is slanted and bent to a side and engages with an inclined guide (23) of an axially shiftable bolt (21), said bolt in its locking position engages with one of the two lateral jaws (19) bearing the seat member (1) and mounted on the swiveling axle (17).

3. Seating furniture according to claim 1, wherein a further locking lever (31) cooperating with a continuation (29) of the operating lever (3) and developed in the manner of a bolt keeper is disposed on the swiveling axis (26) for the two-armed shifting lever (25) for the adjustment of the inclination of the seat member, the lever arm (32) of said lever facing away from the continuation (29) and engaging with a bolt (33) which can be depressed counter to the action of a spring (35) and locking the horizontal shifting of the back support (2).

4. Seating furniture according to claim 3, wherein a lever arm (38) of the locking bar (31) facing the swiveling axis has on its underside a recess (39) open at the edge and receiving the continuation (29) upon swiveling up of the lever arm (15) of the operating lever (3).

5. Seating furniture according to claim 1, wherein at the level of the middle position of the operating lever (3) a two-armed compensating lever (47) is mounted for cooperating with said operating lever in a counterclockwise rotational direction, one of which lever arms (49) engages with a groove (50) opened at the edge of the lever (31) locking the horizontal shifting of the back support (2), in that it also fits in the rest position approximately against the continuation (29) of the operating lever (3) and in that its other lever arm (46) is connected by means of a cable line tramsmission rod means (45) with a transverse bolt (44) locking the height adjustment of the back support (2).

6. Seating furniture according to claim 1, wherein the end of the actual shiftable developed operating lever (3) projecting into the housing-like hub (4) has an opening contact or a plug contact in order to close the electric circuit of a vibrator provided on the seat member (1).

* * * * *