

Description

Synchronization mechanism

- 5 The invention relates to a synchronization mechanism for a correlated movement of seat and backrest of an office chair comprising a basic support placed on a chair post, a seat support and a backrest support.
- 10 The term "synchronization mechanism" describes assemblies in the substructure of an office chair seat, such assemblies providing the interlinked kinematics that bring about certain relative movements of seat and backrest. The, generally upholstered, seat is mounted on the seat support of the
- 15 office chair. The backrest support that usefully extends backwards from the actual synchronization mechanism supports the backrest of the office chair on an upright cantilever. Seat support and backrest support are usually flexibly coupled so that a backward tilt of the backrest - caused e.g.
- 20 by a chair user leaning against the backrest - induces a lowering of the rear edge of the seat.

In order to change the "tilting resistance" of the backrest, such synchronization mechanisms usually incorporate spring

25 assemblies for pre-stressing the synchronization mechanisms. The pre-stress level depends inter alias on the weight of the chair user.

It is an object of the present invention to provide a

30 synchronization mechanism for which an adjustment of the spring tension to change the "tilting resistance" of the backrest is not required.

This object is accomplished by a synchronization mechanism

35 according to claim 1. It involves a system whereby the

backrest support that is pivotable around a lateral axis is directly linked in a pivotable manner to, on the one hand, the basic support and, on the other, the rear end section of the seat support in such a manner that a backward tilt of the backrest induces a lifting of the rear area of the seat support. At the same time, the seat support is so linked to the basic support as to cause a lifting of the front area of the seat support.

10 A basic idea of the invention is that the user of the office chair "lifts" him/herself up by leaning against the backrest. No spring tension adjustment controls as known from prior art involving intricate control mechanisms (worm gears, cogwheels, threaded rods etc.), are required. This
15 significantly reduces the manufacturing costs of the synchronization mechanism. At the same time it increases the reliability.

Due to the fact that the seat support is lifted not only in its rear area but that a lift of the front area of the seat support occurs at the same time, a synchronous simultaneous upward and backward movement of the seat in a predefined relation to the backrest takes place. Due to the chosen design, the opening angle of the backrest can be quite wide
20 compared with the solutions known from prior art. Thus, extreme back positions are possible as well.

Advantageous embodiments of the invention are given in the dependent claims.

30 Of special advantage is a design where the basic support is connected to the front end of the seat support via a linear guide. This facilitates a synchronised linear movement of the seat with the backrest. Apart from linear guides with
35 straight-lined guide tracks, different guide tracks are

naturally also possible. The design of the guide, the position of the guide (e.g. the inclination of the guide in relation to the horizontal) etc., facilitate an individual adaptation of the synchronised movement of the seat support.

5 It is, for instance, possible for the seat support to move synchronously with the backrest in an absolutely linear fashion, without any "tilting" at all. A suitable design of the guide also permits a slight "tilting". Other variations can be achieved by positioning the connection point between
10 the basic support and the seat support at smaller or greater distances from the front edge of the seat.

When the office chair has a seating area designed so that a user imitates any tilting movement of the backrest to a
15 position further back, the so-called "shirt stripping effect" can be prevented very effectively as well.

The lever geometry required for the "self-adjusting" mechanism of the present invention is achieved preferably by
20 an arrangement whereby the swivel axis of the connection between the backrest support and the basic support, seen in longitudinal direction of the chair, is positioned behind the hinge axis of the connection between the backrest support and the seat support.

25 Although, according to the invention, no adjustment of the spring tension is required, a device for adjusting the working area can be provided. This is achieved in an advantageous manner by a spring element arranged preferably
30 in an essentially horizontal position in the seat support, such spring element being connected to, on the one hand, the seat support and, on the other, a bearing axle that is positioned crosswise and linked to the basic support. The bearing axle has an eccentric design so that by turning it,

the user will cause a displacement of the axle centre and thus a change in the spring suspension, thereby facilitating an adjustment between at least two spring tension settings ("hard"/"soft").

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Compared with the solutions known from prior art, the invention introduces a constructively very simple swivel mechanism. This reduces the manufacturing costs. Moreover, despite its simple construction, it significantly reduces the so-called "shirt-stripping effect". In order words, a very high degree of sitting comfort is achieved without having to resort to complicated and expensive solutions.

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One example of the invention is explained in detail below with reference to the drawings. In the said drawings:

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Fig. 1 shows a perspective view of the synchronization mechanism seen diagonally from the back,

Fig. 2 shows a lateral view of the synchronization mechanism in a cross section,

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Fig. 3 shows a perspective view of the synchronization mechanism seen from the top at the back,

Fig. 4 shows a top view of the synchronization mechanism in a cross section.

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The synchronization mechanism features a basic support 1 fitted to the top end of a chair post (not shown) by means of a taper socket 2, see Fig. 1. The synchronization mechanism comprises essentially a frame-shaped seat support 3 (see Fig. 3) and in top view a fork-shaped backrest support 4, the cheeks 5, 6 of which are arranged on both sides of the basic support 1. All the drawings show the basic position where the backrest support 4 has an essentially vertical position.

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A seat 7 with an upholstered surface is mounted on the seat support 3. It is assembled in the customary manner with fastening elements not shown in detail here. The seat 7 is secured firmly to the seat support 3 so that any movement of the seat support 3 will cause a corresponding movement of the seat 7.

Fitted to the backrest support 4 is a backrest, not shown in detail, which in modern office chairs is height-adjustable. The backrest can also be connected with the backrest support 4 as a single unit.

As can be seen from the illustrations, the whole synchronization mechanism, insofar as the actual kinetics are concerned, is designed in mirror symmetry in relation to the central longitudinal plane M (see Fig. 4). The following description therefore always relates to pairs of the structural elements of the swivel mechanism.

The backrest support 4 is attached on the one hand to a swivel bearing 8 on the basic support 1, so that the backrest support 4 is directly hinged to the basic support 1 via the said swivel bearing 8. As a result the backrest support 4 with the actual backrest can be tilted in tilting direction S around the swivel axis 9 running through the swivel bearing 8, see Fig. 2. The swivel bearing 8 is formed in front of the front edge 10 of the cheek 5, 6.

On the other hand, the backrest support 4 with the front edge 10 of its cheek 5, 6 is connected via a hinge 11 to the rear end section 12 of the seat support 3. Thus, as a result of a backward tilt of the backrest the seat support 3 is carried along in tilting direction S and also lifted due to the lever arrangement formed by the cheek 5, 6. In other words, there is a swing around the axis 13 of the hinge 11.

Seen in longitudinal direction 14 of the chair, the swivel axis 9 of the connection of the backrest support 4 to the basic support 1 is fitted behind the hinge axis 13 of the connection of the backrest support 4 to the seat support 3. Moreover, the hinge axis 13 of the connection of the backrest support 4 to the seat support 3 is situated above the position of the swivel axis 9 of the connection of the backrest support 4 to the basic support 1.

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The basic support 1 comprises two wings 16, 17 running in the direction of the seat support front edge 15. As can be seen in Fig. 3, the said wings 16,17 are each guided in a linear sliding guide 18 of the front area of the seat support 3 and connected to one another by a bearing axle 19.

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Due to this design, it is not only the rear area of the seat support 3 that experiences a lift H1 when pressure is placed on the backrest and the backrest support 4 tilts back downwards in tilting direction S, see Fig. 2. In addition, the front area of the seat support 3 is lifted in a synchronous manner (lift H2). In other words, there is a simultaneous lift of both the front and the back of the seating area. The seat 7 is lifted in its entirety.

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The padding 20 of the seating surface, see especially Fig. 2, is made of formed foam. It is divided into two different seating areas 21, 22, arranged behind one another in longitudinal direction 14 of the seat and differing with regard to their upholstering. With the form of seating surface used in the present example, the front seating area 21, which constitutes about 30% to 40% of the total length of the upholstery 20, is fitted with "standard" upholstery thickness, whilst the rear seating area (between 70% and 60% of the total length) is fitted with variable upholstery that

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permits the user to sink in towards the back by way of rolling back. In the example shown, the upholstery thickness of the rear seating area 22 is higher by at least 20 mm compared with the upholstery thickness of the front seating area 21. The manner of transition from the front seating area 21 to the rear seating area 22 is preferably very soft and smooth without any ridges. Particularly good results are achieved with a transition area in the form of an elongated horizontal S.

The transition from the front seating area 21 to the rear seating area 22 is so arranged that the user in a normal ("average") seating position will put his weight mainly on the front seating area 21. When pressure is put on the backrest, the user's pelvis rolls over the horizontal S into the rear seating area 22. The user thus follows the movement of the backrest back downwards. In other words, the user's backward movement and the connected pressure on the seat 7 in the rear area leads to a "yielding" of the seat and with it a gliding into the upholstery 20 by the user in the form of rolling. A highly synchronised sequence of movements between the backrest and the user is achieved in this way. The so-called "shirt stripping" effect can be significantly reduced as a result.

The foam is preferably free towards the rear seating surface end 23 so that it can expand backwards. To achieve this, an open design of the upholstery 20 without any bordering elements at the back is preferred.

The concept 'upholstery' is understood to mean any type of flexible design of the seating surface, regardless of the material used. Apart from formed foams, any other elastic materials may be employed, such as spring packets, or

combinations of materials, such as e.g. foam in conjunction with silicon cushions. The use of e.g. dual zone foam is possible as well.

5 The firmness of the "tilting resistance" of the backrest in the example shown can be switched between two stages from "hard" to "soft". For this purpose, a tension spring 24 fitted in essentially horizontal position in the seat support 3 is provided, which with its front end 25 is attached to the
10 eccentric bearing axle 19 and with its rear end 26 to the seat support 3. The bearing axle 19 can be turned around its axis from a first to a second position by an operating element 27 fitted at the side (see Fig. 4). Due to the eccentric design of the bearing axle 19, see Fig. 4, the
15 position of the front attachment of the tension spring 24 is changed as well when the bearing axle 19 is turned. The initial stress of the tension spring 24 changes accordingly. Thus, a more or less firm tilting resistance is achieved relative to the position of the bearing axle 19. The number
20 of tension springs 24 is not restricted to one. Depending on the design, further tension springs 24 can be fitted in parallel.

To arrest the inclination of the backrest, there is obviously
25 a mechanism provided, which is not described in detail here but which is operated by means of a lever 28.

Reference list

- 30 1 Basic support
 2 taper socket
 3 seat support
 4 backrest support
 5 cheek

	6	cheek
	7	seat
	8	swivel bearing
	9	swivel axis
5	10	front end of cheek
	11	hinge
	12	rear end section of the seat support
	13	hinge axis
	14	longitudinal direction of the chair
10	15	seat support front edge
	16	wing
	17	wing
	18	sliding guide
	19	bearing axle
15	20	upholstery
	21	front seating area
	22	rear seating area
	23	rear seating surface end
	24	tension spring
20	25	front end of spring
	26	back end of spring
	27	operating element
	28	operating lever

Claims

1. A synchronization mechanism for a correlated movement of seat and backrest of an office chair, comprising a basic support (1) placeable on a chair post, a seat support (3) and a backrest support (4), whereby the backrest support (4) that is pivotable around a lateral axis (9) is directly linked in a pivotable manner to the basic support (1) on the one hand, and to the rear end section (12) of the seat support (3) on the other hand, in such a manner that a backward tilt (S) of the backrest induces a lifting (H1) of the rear area of the seat support (3) and whereby the seat support (3) is so linked to the basic support (1) as to cause a simultaneous lifting (H2) of the front area of the seat support (3).
2. The synchronization mechanism according to claim 1, whereby the basic support (1) is connected to the seat support (3) via a guiding (18).
3. The synchronization mechanism according to claim 2, whereby the guiding (18) is a linear guiding.
4. The synchronization mechanism according to one of the claims 1 to 3, whereby seen in longitudinal direction (14) of the chair, the swivel axis (9) of the connection of the backrest support (4) to the basic support (1) is fitted behind the hinge axis (13) of the connection of the backrest support (4) to the seat support (3).