Abstract: Mechanism for reclining armchairs or sofas, which comprises at least one seat support (1) and one back support (2) which are mutually pivoted for oscillating with respect to a base (3), wherein a slide (19) can run in a longitudinal direction along one or more longitudinal guides (14) fixed to the seat support (1) for extracting or retracting a footrest support (25) mounted in a mobile manner on the slide (19). The present invention also relates to an armchair or a sofa comprising said mechanism.
MECHANISM FOR RECLINING ARMCHAIRS OR SOFAS

The present invention relates to a mechanism for reclining armchairs or sofas, ad in particular to a mechanism which allows to recline the seat and the back of an armchair or a sofa. The present invention also relates to an armchair or a sofa comprising said mechanism.

EP 1438909 discloses a mechanism for reclining armchairs, which comprises a seat support arid a back support which are mutually pivoted for oscillating with respect to a base, wherein the back support is mechanically connected by means of a pair of levers to a rear extension of the base arranged behind the back support. Said levers can rotate around substantially horizontal axes, while the seat support is pivoted to a carriage which can run on the base.

Said mechanism comprises a footrest support which allows a relatively limited number of positions of the footrest.

It is therefore an object of the present invention to provide a mechanism free from said disadvantage. Said object is achieved with a mechanism, whose main features are disclosed in the first claim, while other features are disclosed in the remaining claims.

Thanks to the particular structure supporting the footrest support, the mechanism according to the present invention can be provided with a footrest having a wide scope of positions with respect to the seat support.

Thanks to the particular levers connecting the base to the seat support, the mechanism according to the present invention can easily pass from the erect position to the reclined position, and vice versa, but it keeps the erect position firmly, so as to avoid undesired movements.

Thanks to its particular structure, the mechanism according to the present invention can be also easily provided with a first electric pusher for its automatic drive, as well as with a second electric pusher for the independent movement of the footrest support.

The mechanism according to the present invention is preferably provided with a particular headrest support synchronized with the movement of the back support.

Further advantages and features of the mechanism according to the present
invention will become clear to those skilled in the art from the following detailed and non-limiting description of an embodiment thereof with reference to the attached drawings, wherein:

- figure 1 shows a side view of the mechanism in an erect position;
- figure 2 shows a top view of the mechanism of figure 1;
- figure 3 shows a side view of the mechanism in a reclined position;
- figure 4 shows a top view of the mechanism of figure 3;
- figure 5 shows an enlarged side view of an upper portion of the mechanism of figure 1;
- figure 6 shows an enlarged front view of the portion of figure 5;
- figure 7 shows an enlarged side view of an upper portion of the mechanism of figure 3;
- figure 8 shows an enlarged front view of the portion of figure 7;
- figure 9 shows a side view of the mechanism with the extended footrest;
- figure 10 shows a top view of the mechanism of figure 9;
- figure 11 shows a side view of the mechanism with the extended and lifted footrest; and
- figure 12 shows a top view of the mechanism of figure 11;
- figure 13 shows a side view of an armchair with the mechanism in an erect position; and
- figure 14 shows a side view of an armchair with the mechanism in a reclined position.

Referring to figures 1 and 2, it is seen that the mechanism according to the present invention comprises in a known way at least one seat support 1 and one back support 2 which are mutually pivoted for oscillating with respect to a base 3 by means of one or more levers suitable for rotating around substantially horizontal axes. Base 3 comprises a rear extension 4 arranged behind back support 2.

Seat support 1 can oscillate around a substantially horizontal axis A and run on this axis by means of one or more wheels 5 (shown with broken lines) which can rotate around the same axis A. Wheels 5 are rotatably mounted on a fixed crossbar 6 mounted on base 3 under seat support 1. Wheels 5 can run along auxiliary guides 1a arranged
along the sides of a front portion of seat support 1. Seat support 1 is mechanically connected to base 3 by means of one or more first levers 7, in particular a pair of levers 7 pivoted to the sides of seat support 1 and of base 3 for rotating around substantially horizontal axes. The distance between the pivoting points of seat support 1 to back support 2 and to first levers 7 is shorter than the half of the depth of seat support 1. In other words, the pivoting point of seat support 1 to first levers 7 is close to the pivoting point of seat support 1 to back support 2. Back support 2 is mechanically connected to rear extension 4 by means of one or more second levers 8, in particular a pair of levers 8 pivoted to the sides of back support 2 and of rear extension 4 for rotating around substantially horizontal axes. The distance between the upper end of back support 2 and the pivoting point of back support 2 to second levers 8 is shorter than the half of the height of back support 2. In other words, the pivoting point of back support 2 to second levers 8 is close to the upper end of back support 2.

A first pusher 9 driven by an electric motor 10 is pivoted to a crossbar of rear extension 4 for oscillating around a substantially horizontal axis with respect to base 3. The mobile member 11 of first pusher 9 moves along a longitudinal axis and is connected to a first mobile crossbar 12 (shown with broken lines in figure 1) having the ends provided with side appendixes 13 pivoted to first levers 7, so that first pusher 9 can extend or retract seat support 1 and back support 2 for changing from an erect to a reclined position, or vice versa. Side appendixes 13 are pivoted to first levers 7 between the pivoting points of the latter to seat support 1 and to base 3.

One or more longitudinal guides 14 are mounted under seat support 1 by means of a structure comprising one or more uprights 15, 16 and/or crossbars 17, 18. A slide 19 can run in a longitudinal direction along longitudinal guides 14 for protruding in front of seat support 1. In the erect position of the mechanism, angle B comprised between first levers 7 and a longitudinal half-line H extending forwards from their pivoting point to base 3 is obtuse. A second pusher 20 driven by an electric motor 21 is fixed to a crossbar 22 arranged under seat support 1, in particular between longitudinal guides 14. The mobile member of second pusher 20 moves along a longitudinal axis and is connected to a second mobile crossbar 23 in turn connected to slide 19 by means of one or more longitudinal rods 24, so that second pusher 20 can extend or retract slide 19.
under seat support 1 in a longitudinal direction. A footrest support 25 is mounted in a mobile manner on slide 19 by means of one or more pairs of crossed levers 26, 27 pivoted to each other in a central zone and having an end pivoted to slide 19 or to footrest support 25, respectively. The other end of the pairs of crossed levers 26, 27 is provided with wheels 28, 29 (shown with broken lines) suitable for running longitudinally in guides fixed to slide 19 or to footrest support 25, respectively, so that the mutual rotation of the pairs of crossed levers 26, 27 acts as a pantograph for lifting or lowering the footrest support 25 with respect to slide 19.

A headrest support 30 can run along one or more upper guides 31 pivoted to back support 2, wherein one or more upper levers 32 are pivoted to headrest support 30 and to rear extension 4 for rotating around a substantially horizontal axis. Upper guides 31 are mechanically connected to rear extension 4 through one or more auxiliary levers 33 suitable for rotating around a substantially horizontal axis. Rear extension 4, upper guides 31, upper levers 32 and auxiliary levers 33 form articulated quadrilaterals. One or more elastic pulling means 34 are arranged under seat support 1 in a substantially longitudinal position. A longitudinal bar 35 connects crossbars 17, 18 fixed under seat support 1.

Referring to figures 3 and 4, it is seen that when electric motor 10 is driven, first pusher 9 moves forwards mobile member 11, first mobile crossbar 12 and side appendixes 13, so as to rotate forwards first levers 7 with respect to base 3 and push forwards seat support 1, which runs on wheels 5. Simultaneously, seat support 1 inclines backwards and back support 2 is pulled forwards by seat support 1, so that it also lowers and inclines backwards. In the reclined position of the mechanism, angle C comprised between first levers 7 and longitudinal half-line H is acute and smaller than the supplementary angle of angle B_5 i.e. 180°-B>C. The upper portion 4a of rear extension 4 is bent forwards.

Referring also to figures 5 to 8, it is seen that the downward and forward movement of back support 2, guided by second levers 8, causes the forward and upward rotation of upper guides 31, so that also headrest support 30 rotates forward and upward, running along upper guides 31 and being guided by upper levers 32 and by auxiliary levers 33. The arrows of figure 5 show the movement of said members during the
change from the erect position to the reclined position. Angle D comprised between back support 2 and upper guides 31 in the reclined position of the mechanism is comprised between 150° and 200°, while it is greater than 200° in the erect position.

Referring to figures 9 and 10, it is seen that when electric motor 21 is driven, second pusher 20 moves forward second mobile crossbar 23 and longitudinal rods 24, so as to move forward slide 19 with respect to seat support 1 along longitudinal guides 14. Slide 19 is pivoted to cursors 36 which also run in longitudinal guides 14, so that when slide 19, pushed forward by second pusher 20, comes out of the front end of longitudinal guides 14, cursors 36 connect slide 19 to longitudinal guides 14. Slide 19, being out of longitudinal guides 14, is however free of rotating downward around a substantially horizontal axis, until it rests on the ground thanks to one or more feet 37 preferably provided with wheels with a substantially horizontal axis. Longitudinal rods 24 are pivoted to at least one of crossed levers 26, 27, in particular levers 27 provided with wheels 29 running in the guides fixed to slide 19. Cursors 36 are provided with stop means for preventing a further forward movement after slide 19 has come out of longitudinal guides 14.

Referring to figures 11 and 12, it is seen that when second pusher 20 continues its forward movement up to a stop position of second mobile crossbar 23, longitudinal rods 24 push levers 27 of crossed levers 26, 27, while slide 19 cannot move forward because of the stop means of cursors 36, so that crossed levers 26, 27 rotate mutually, thereby lifting footrest support 25 from slide 19. During the latter forward movement, second pusher 20 stretches elastic pulling means 34, which are fixed between the front end of longitudinal rod 24 and cursors 36, so as to prevent the lifting of footrest support 25 when cursors 36 have not reached the relevant stop means, i.e. when slide 19 is still under seat support 1.

Referring to figures 13 and 14, it is seen that a seat 41, a back 42, a footrest 43 and a headrest 44 (all shown with broken lines) can be mounted on seat support 1, back support 2, footrest support 25 and headrest support 30, respectively, so as to move with the latter during the change from the erect to the reclined position of the mechanism, and vice versa. This movement is represented by the arrows of figure 13.

Slide 19 can be pivoted to cursors 36 through friction means, so as to keep slide
19 lifted and changing angle $E$ comprised between seat support 1 and footrest support 25, for inclining at will footrest 43 in the direction of the arrow of figure 14. In the present invention, angle $E$ is comprised between $170^\circ$ and $220^\circ$. In an alternative embodiment, cursors 36 can be integral with slide 19, so that footrest support 25 remains always substantially parallel to seat support 1. For changing from the reclined position to the erect position of the mechanism it is sufficient to drive the pushers in the opposite direction.

Possible modifications and/or additions may be made by those skilled in the art to the hereinabove disclosed and illustrated embodiment while remaining within the scope of the following claims.
CLAIMS

1. Mechanism for reclining armchairs or sofas, which comprises at least one seat support (1) and one back support (2) which are mutually pivoted for oscillating with respect to a base (3), characterized in that a slide (19) can run in a longitudinal direction along one or more longitudinal guides (14) fixed to the seat support (1) for extracting or retracting a footrest support (25) mounted in a mobile manner on the slide (19).

2. Mechanism according to the previous claim, characterized in that the longitudinal guides (14) are mounted under the seat support (1) by means of a structure comprising one or more uprights (15, 16) and/or crossbars (17, 18).

3. Mechanism according to one of the previous claims, characterized in that the slide (19) is mechanically connected to the mobile member of a second pusher (20).

4. Mechanism according to the previous claim, characterized in that the mobile member of the second pusher (20) moves along a longitudinal axis.

5. Mechanism according to claim 3 or 4, characterized in that the mobile member of the second pusher (20) is connected to a second mobile crossbar (23) connected to the slide (19) by means of one or more longitudinal rods (24).

6. Mechanism according to one of claims 3 to 5, characterized in that the second pusher (20) is fixed to the seat support (1).

7. Mechanism according to the previous claim, characterized in that the second pusher (20) is fixed to a crossbar (22) arranged under the seat support (1).

8. Mechanism according to the previous claim, characterized in that said crossbar (22) is arranged between the longitudinal guides (14).

9. Mechanism according to one of the previous claims, characterized in that the footrest support (25) is mounted on the slide (19) by means of one or more pairs of crossed levers (26, 27) pivoted to each other in a central zone and having an end pivoted to the slide (19) or to the footrest support (25), respectively, so that the mutual rotation of the pairs of crossed levers (26, 27) lifts or lowers the footrest support (25) with respect to the slide (19).

10. Mechanism according to the previous claim, characterized in that the
other end of the pairs of crossed levers (26, 27) is provided with wheels (28, 29) suitable for running longitudinally in guides fixed to the slide (19) or to the footrest support (25), respectively.

11. Mechanism according to claim 9 or 10, characterized in that the longitudinal rods (24) are pivoted to at least one (27) of the crossed levers (26, 27).

12. Mechanism according to the previous claim, characterized in that the longitudinal rods (24) are pivoted to the levers (27) provided with the wheels (29) running in the guides fixed to the slide (19).

13. Mechanism according to one of the previous claims, characterized in that the slide (19) is connected to cursors (36) which run in the longitudinal guides (14), so that when the slide (19) comes out of the front end of the longitudinal guides (14), the cursors (36) connect the slide (19) to the longitudinal guides (14).

14. Mechanism according to the previous claim, characterized in that the slide (19) is pivoted to the cursors (36) for rotating around a substantially horizontal axis when it is extracted from the longitudinal guides (14).

15. Mechanism according to the previous claim, characterized in that the angle (E) comprised between the seat support (1) and the footrest support (25) is comprised between 170° and 220° when the footrest support (25) is extracted from the longitudinal guides (14).

16. Mechanism according to one of claims 13 to 15, characterized in that the cursors (36) are provided with stop means for preventing a further forward movement when the slide (19) is extracted from the longitudinal guides (14).

17. Mechanism according to one of claims 13 to 16, characterized in that one or more elastic pulling means (34) are fixed between the longitudinal rods (24) and the cursors (36).

18. Mechanism according to the previous claim, characterized in that said elastic pulling means (34) are arranged under the seat support (1) in a substantially longitudinal position.

19. Mechanism according to one of claims 14 to 18, characterized in that the slide (19) is pivoted to the cursors (36) through friction means.

20. Mechanism according to one of the previous claims, characterized in that
the back support (2) is mechanically connected to a rear extension (4) of the base (3) arranged behind the back support (2) by means of one or more second levers (8) suitable for rotating around substantially horizontal axes, wherein the seat support (1) can oscillate around a substantially horizontal axis (A), can run on this axis (A) and is mechanically connected to the base (3) by means of one or more first levers (7) suitable for rotating around substantially horizontal axes.

21. Mechanism according to the previous claim, characterized in that the seat support (1) can run on said substantially horizontal axis (A) by means of one or more wheels (5) which can rotate around the same axis (A).

22. Mechanism according to the previous claim, characterized in that the wheels (5) are rotatably mounted on a fixed crossbar (6) mounted on the base (3) under the seat support (1).

23. Mechanism according to claim 21 or 22, characterized in that the wheels (5) can run along auxiliary guides (1a) arranged along the sides of a front portion of the seat support (1).

24. Mechanism according to one of claims 20 to 23, characterized in that the first levers (7) are pivoted to the sides of the seat support (1) and of the base (3).

25. Mechanism according to one of claims 20 to 24, characterized in that the distance between the pivoting points of the seat support (1) to the back support (2) and to the first levers (7) is shorter than the half of the depth of the seat support (1).

26. Mechanism according to one of claims 20 to 25, characterized in that the second levers (8) are pivoted to the sides of the back support (2) and of rear extension (4).

27. Mechanism according to one of claims 20 to 26, characterized in that the distance between the upper end of the back support (2) and the pivoting point of the back support (2) to the second levers (8) is shorter than the half of the height of the back support (2).

28. Mechanism according to one of claims 20 to 27, characterized in that the first levers (7) are mechanically connected to the mobile member (11) of a first pusher (9).

29. Mechanism according to the previous claim, characterized in that the
mobile member (11) of the first pusher (9) moves along a longitudinal axis.

30. Mechanism according to claim 28 or 29, characterized in that the mobile member (11) of the first pusher (9) is connected to a first mobile crossbar (12) having the ends provided with side appendixes (13) pivoted to the first levers (7).

31. Mechanism according to the previous claim, characterized in that the side appendixes (13) are pivoted to the first levers (7) between the pivoting points of the latter to the seat support (1) and to the base (3).

32. Mechanism according to one of claims 28 to 31, characterized in that the first pusher (9) is pivoted to the rear extension (4) for oscillating around a substantially horizontal axis with respect to the base (3).

33. Mechanism according to one of claims 20 to 32, characterized in that in the erect position of the mechanism the angle (B) comprised between the first levers (7) and a longitudinal half-line (H) extending forwards from their pivoting point to the base (3) is obtuse.

34. Mechanism according to the previous claim, characterized in that in the reclined position of the mechanism the angle (C) comprised between the first levers (7) and said longitudinal half-line (H) is acute.

35. Mechanism according to the previous claim, characterized in that in the reclined position of the mechanism the angle (C) comprised between the first levers (7) and said longitudinal half-line (H) is smaller than the supplementary angle of the angle (B) comprised between the first levers (7) and said longitudinal half-line (H) in the erect position of the mechanism.

36. Mechanism according to one of the previous claims, characterized in that a headrest support (30) can run along one or more upper guides (31) pivoted to the back support (2), wherein one or more upper levers (32) are pivoted to the headrest support (30) and to the rear extension (4) for rotating around a substantially horizontal axis.

37. Mechanism according to the previous claim, characterized in that the upper guides (31) are mechanically connected to the rear extension (4) through one or more auxiliary levers (33) suitable for rotating around a substantially horizontal axis.

38. Mechanism according to the previous claim, characterized in that the rear extension (4), the upper guides (31), the upper levers (32) and the auxiliary levers (33)
form articulated quadrilaterals.

39. Mechanism according to one of claims 36 to 38, characterized in that during the change from the erect position to the reclined position of the mechanism the upper guides (31) rotate forward and upward, so that also the headrest support (30) rotates forward and upward, running along the upper guides (31) and being guided by the upper levers (32) and by the auxiliary levers (33).

40. Mechanism according to one of claims 36 to 39, characterized in that the angle (D) comprised between the back support (2) and the upper guides (31) in the reclined position of the mechanism is comprised between 150° and 200°.

41. Mechanism according to one of claims 36 to 40, characterized in that the angle (D) comprised between the back support (2) and the upper guides (31) in the erect position of the mechanism is greater than 200°.

42. Armchair, characterized in that it comprises a mechanism according to one of the previous claims.

43. Sofa, characterized in that it comprises a mechanism according to one of claims 1 to 41.
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

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

- **INV.** A47C1/035  A47C17/13  A47C17/207  A47C1/037

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

A47C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
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<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
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**D.** Further documents are listed in the continuation of Box C

**X** See patent family annex

* Special categories of cited documents

- A: document defining the general state of the art which is not considered to be of particular relevance
- E: earlier document but published on or after the international filing date
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Citation of document, with indication, where appropriate, of the relevant passages

- Date of the actual completion of the international search

28 January 2008

- Date of mailing of the international search report

04/02/2008

- Name and mailing address of the ISA/ European Patent Office, P B 5818 Patentlaan 2 NL - 2280 HV Rijswijk
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