

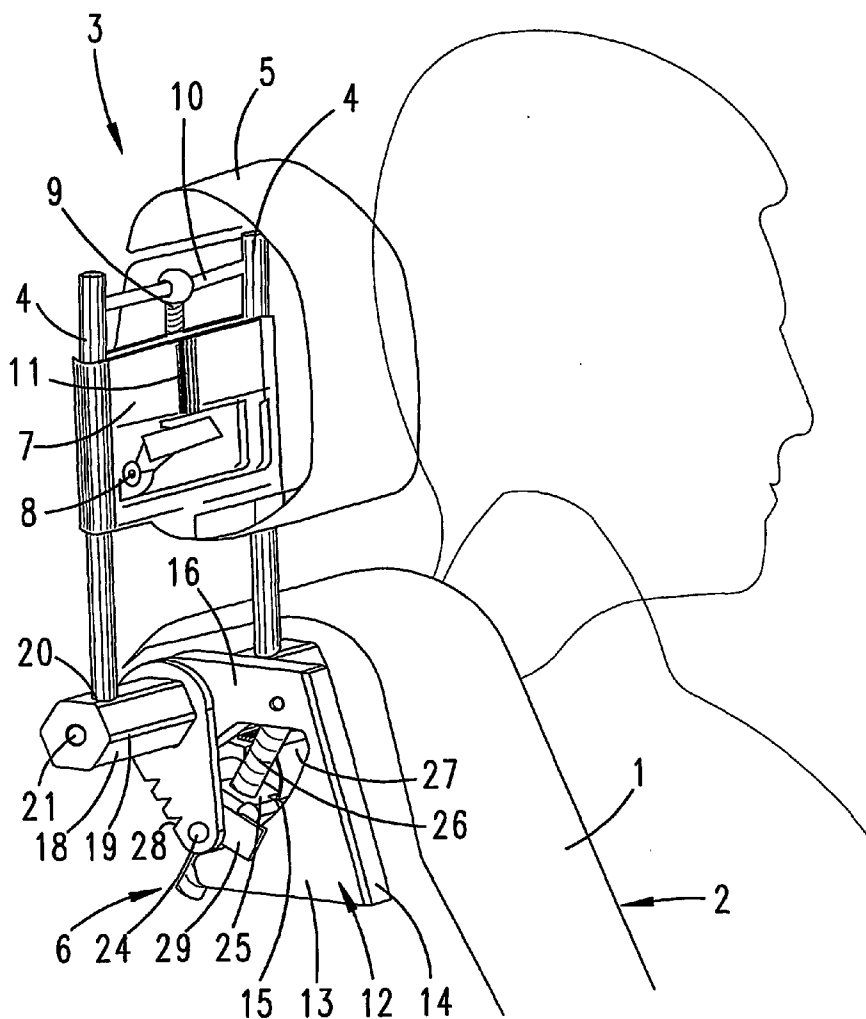


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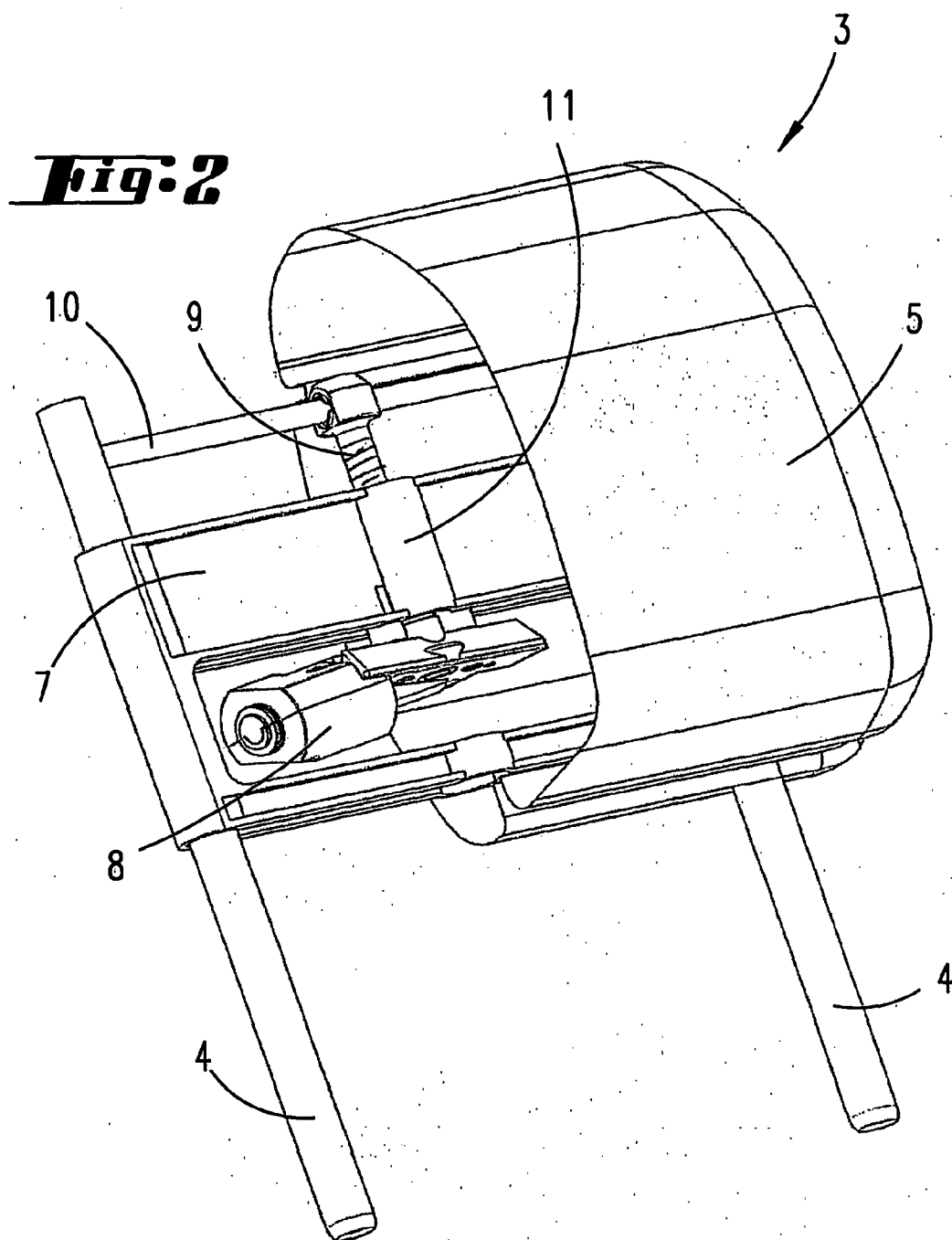
(19) **United States**(12) **Patent Application Publication**  
**Linnenbrink et al.**(10) **Pub. No.: US 2006/0226689 A1**(43) **Pub. Date: Oct. 12, 2006**(54) **HEADREST WITH ADJUSTMENT  
MECHANISM****Publication Classification**(76) Inventors: **Jörg Linnenbrink**, Wuppertal (DE);  
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**New York, NY 10017 (US)**(57) **ABSTRACT**(21) Appl. No.: **10/545,627**(22) PCT Filed: **Feb. 13, 2004**(86) PCT No.: **PCT/EP04/01360**(30) **Foreign Application Priority Data**

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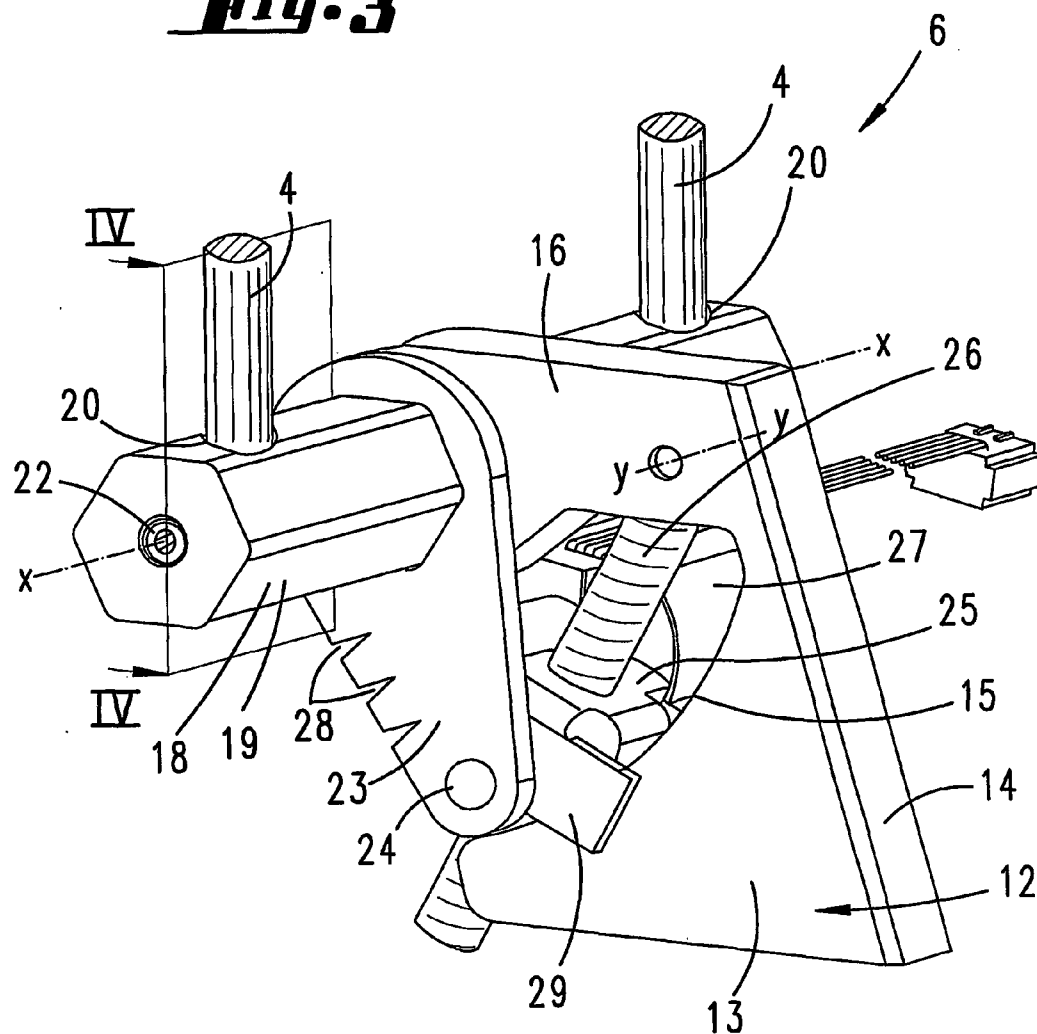
Headrest (3) with adjustment mechanism, for motor vehicles, wherein an angular position of the headrest (3) relative to a backrest (1) of a seat (2), is adjustable. The headrest has two holding brackets (4) which are plugged into holding receptacles (20), the holding receptacles (20) being pivotable to change the angular position. The holding receptacles (20) are connected by a connecting body (19) having a cross-section corresponding at least to twice the diameter of a holding bracket (4), and are formed in the connecting body (19). The holding length (1) corresponds to no more than three times the diameter (d) of a holding bracket (4).



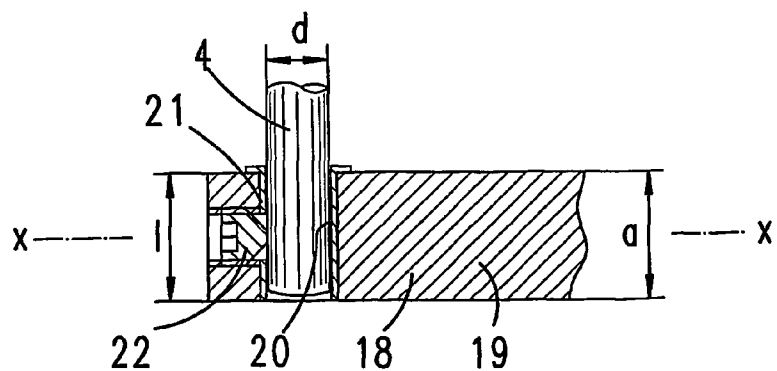




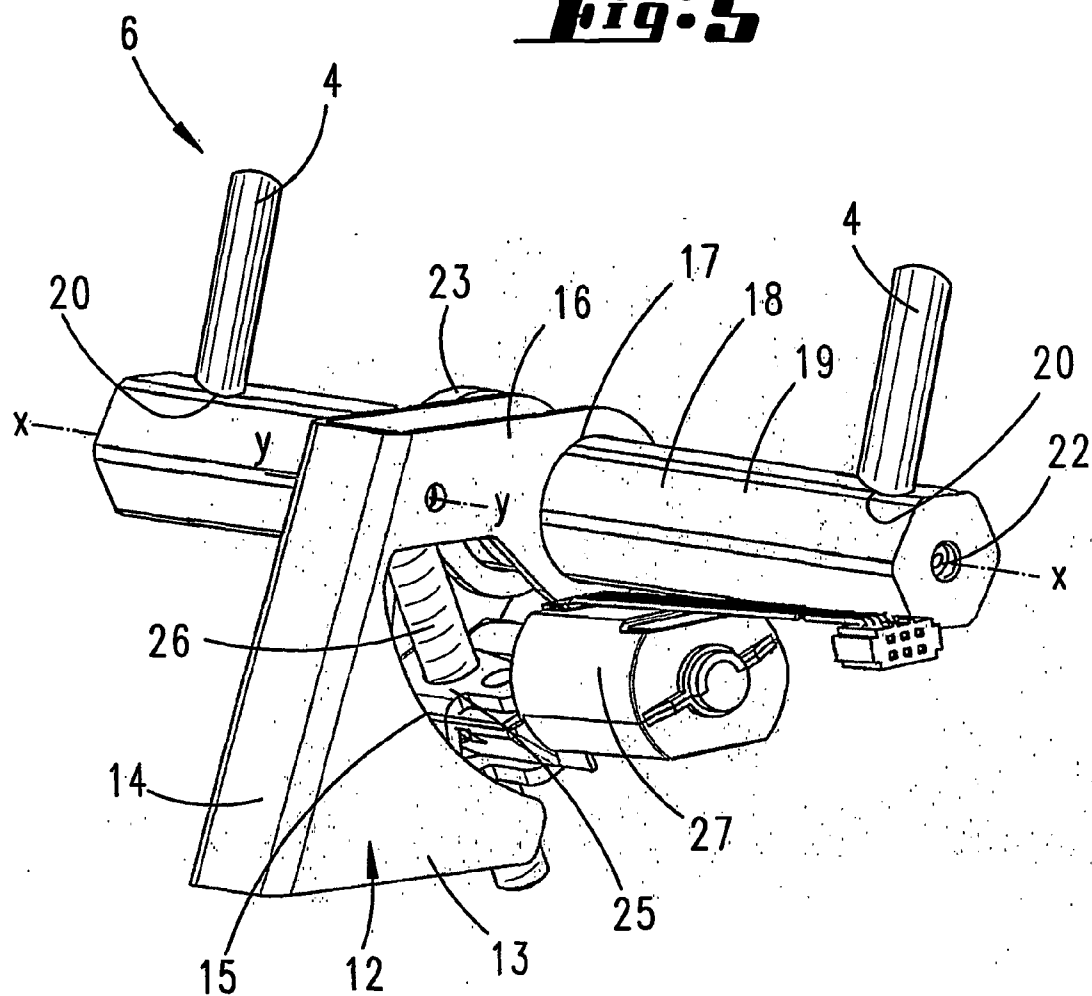
***Fig: 3***



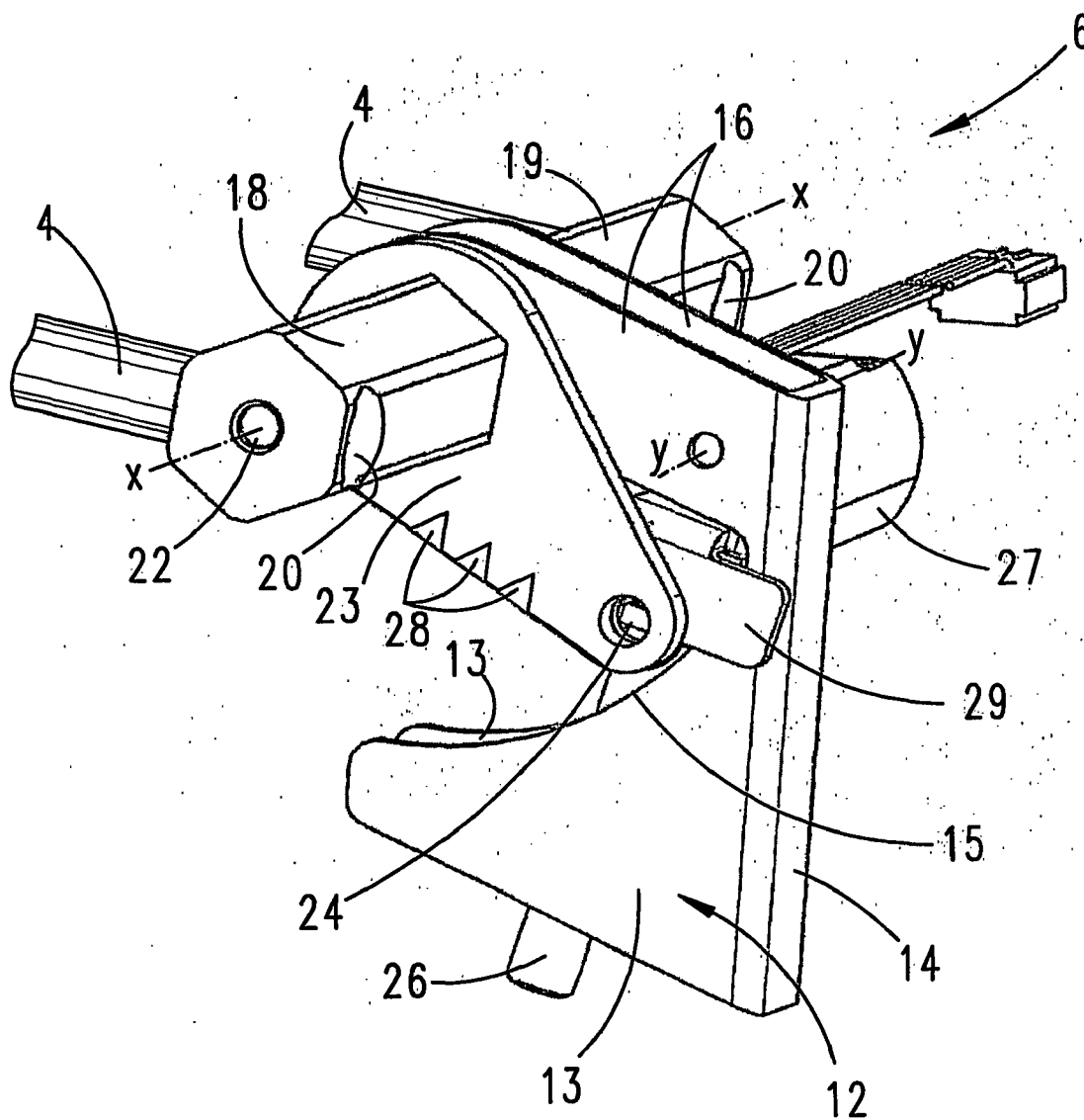
**Fig:4**

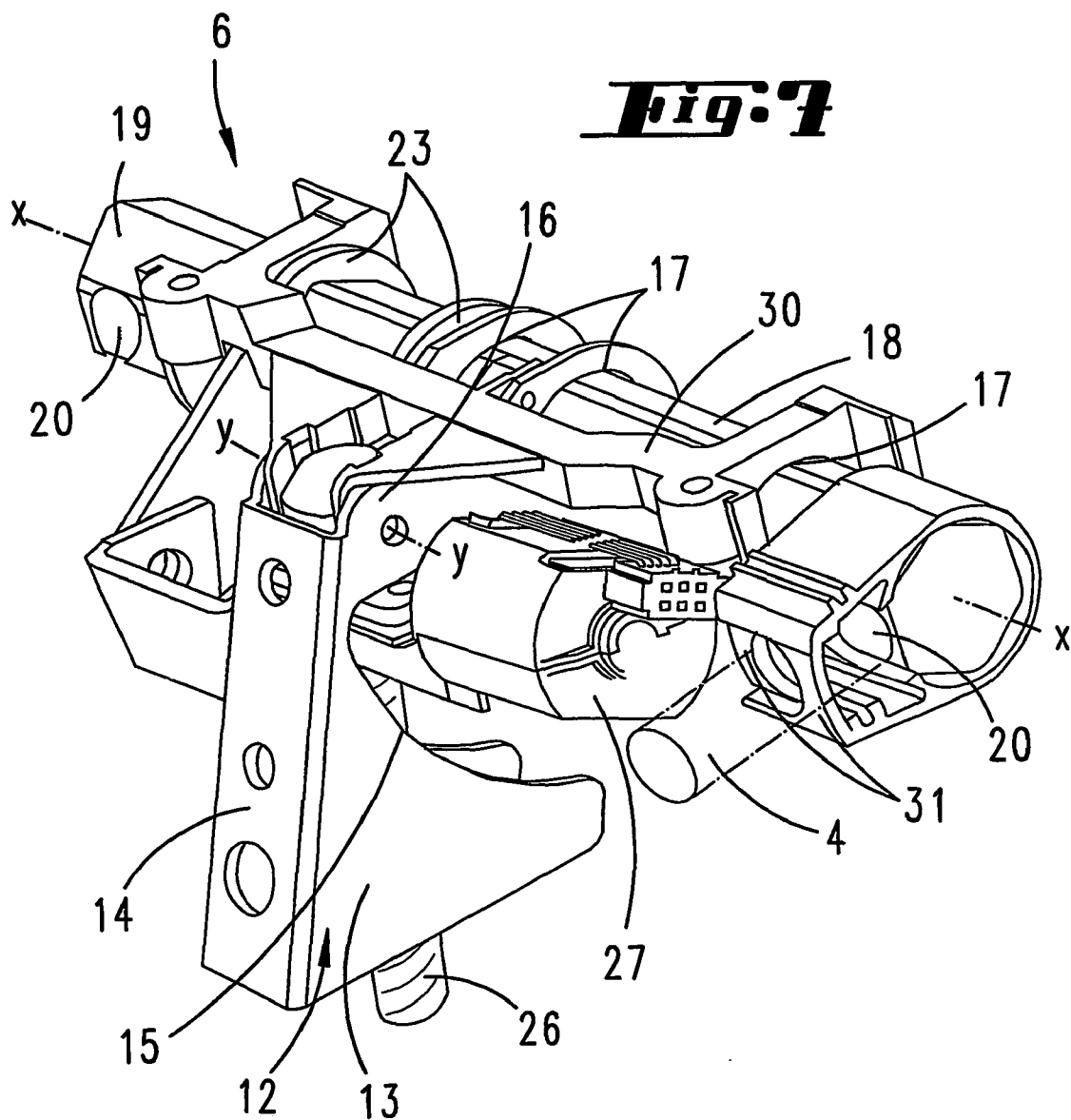


**Fig. 5**

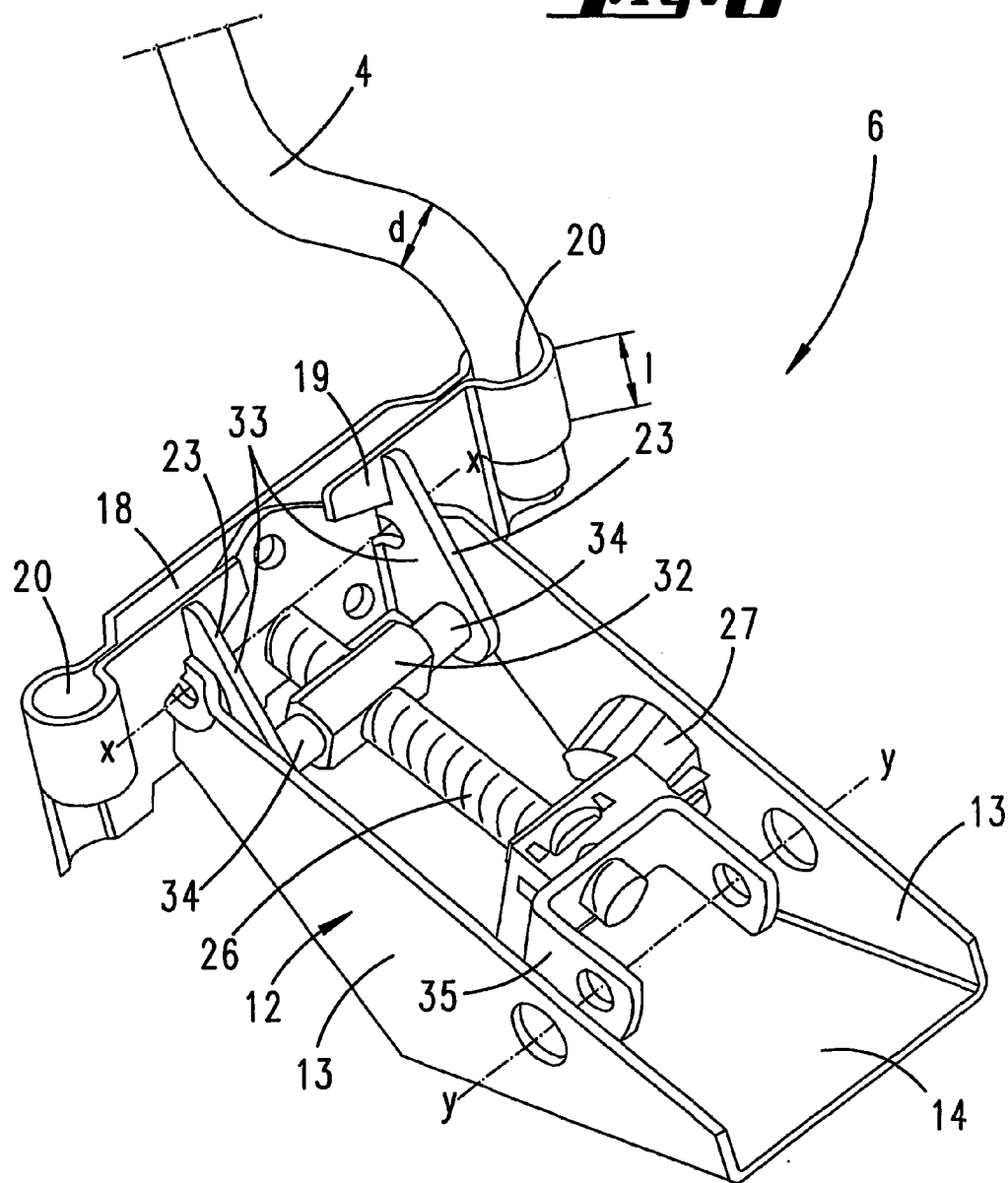


**Fig. 6**

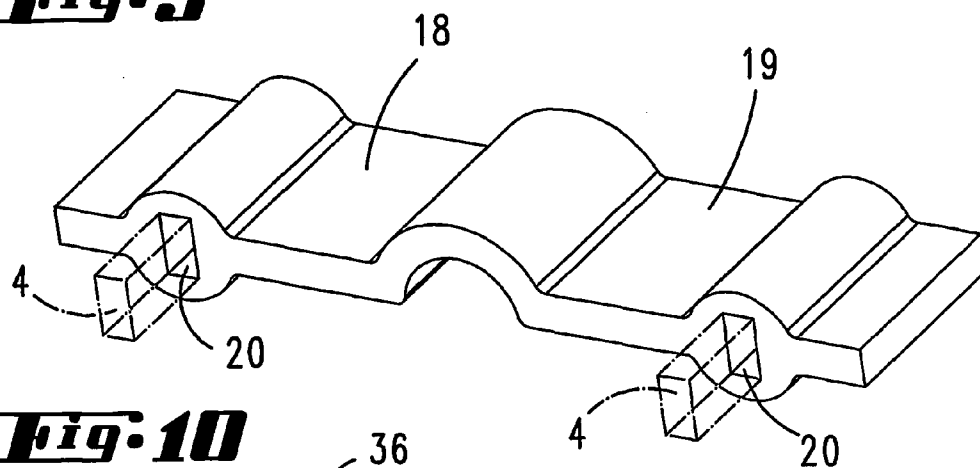




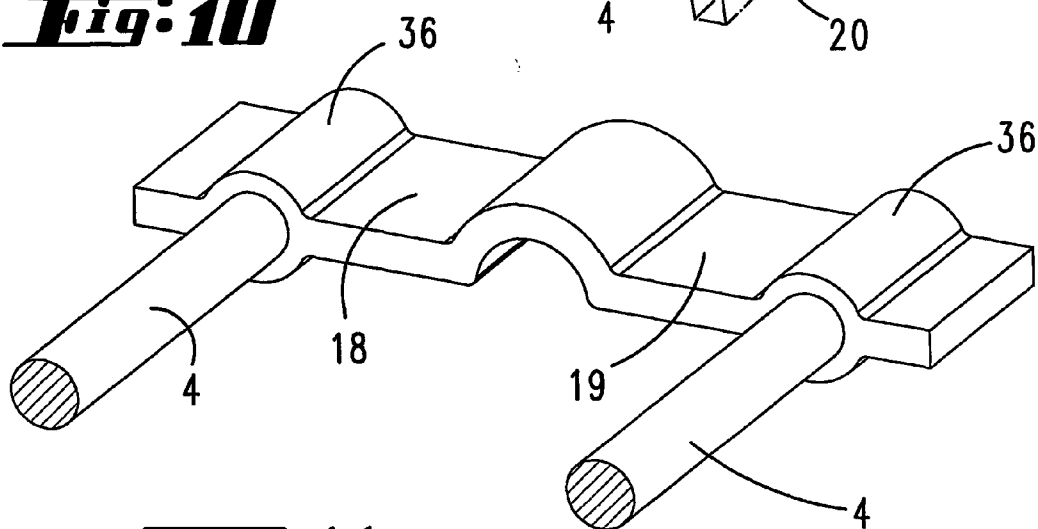
**Fig. 8**



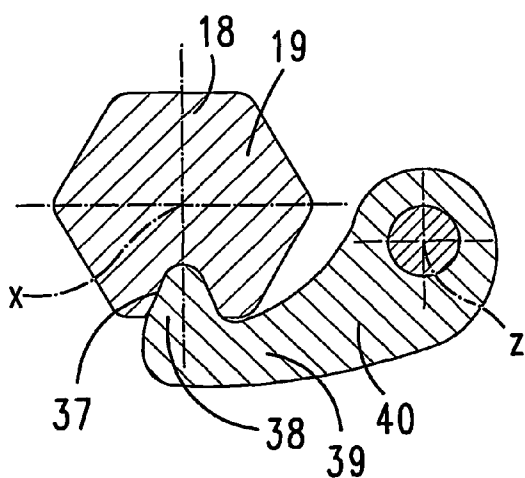
**Fig. 9**



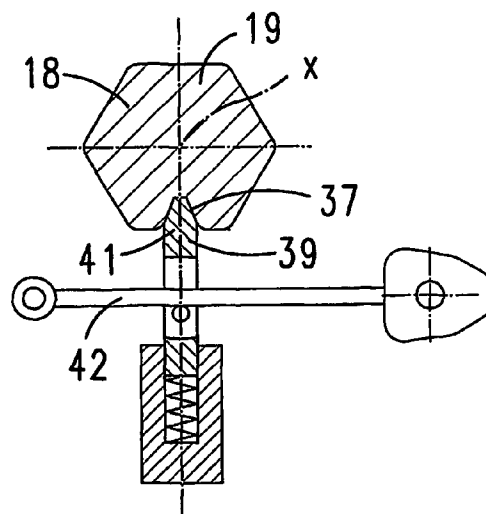
**Fig. 10**



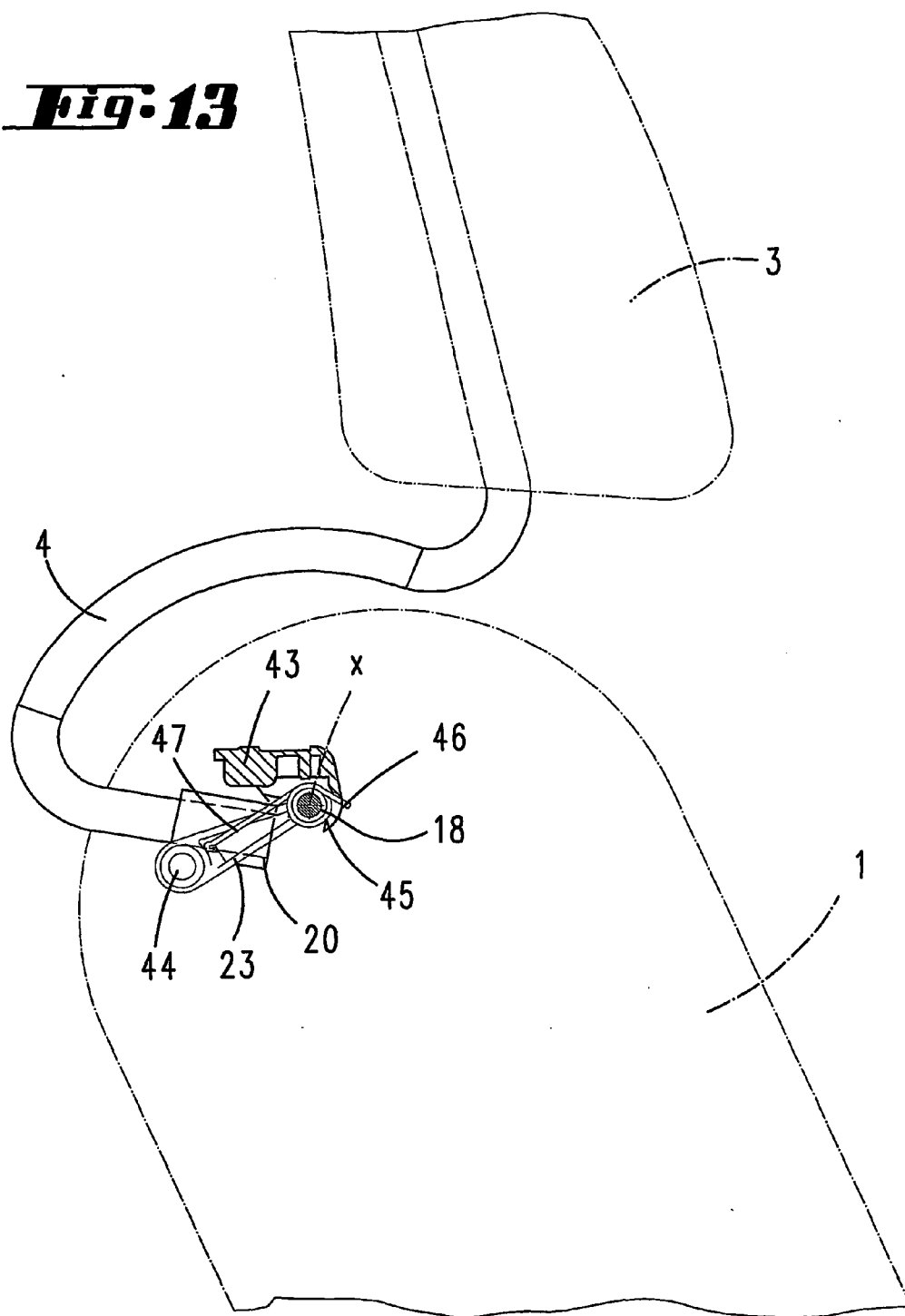
**Fig. 11**



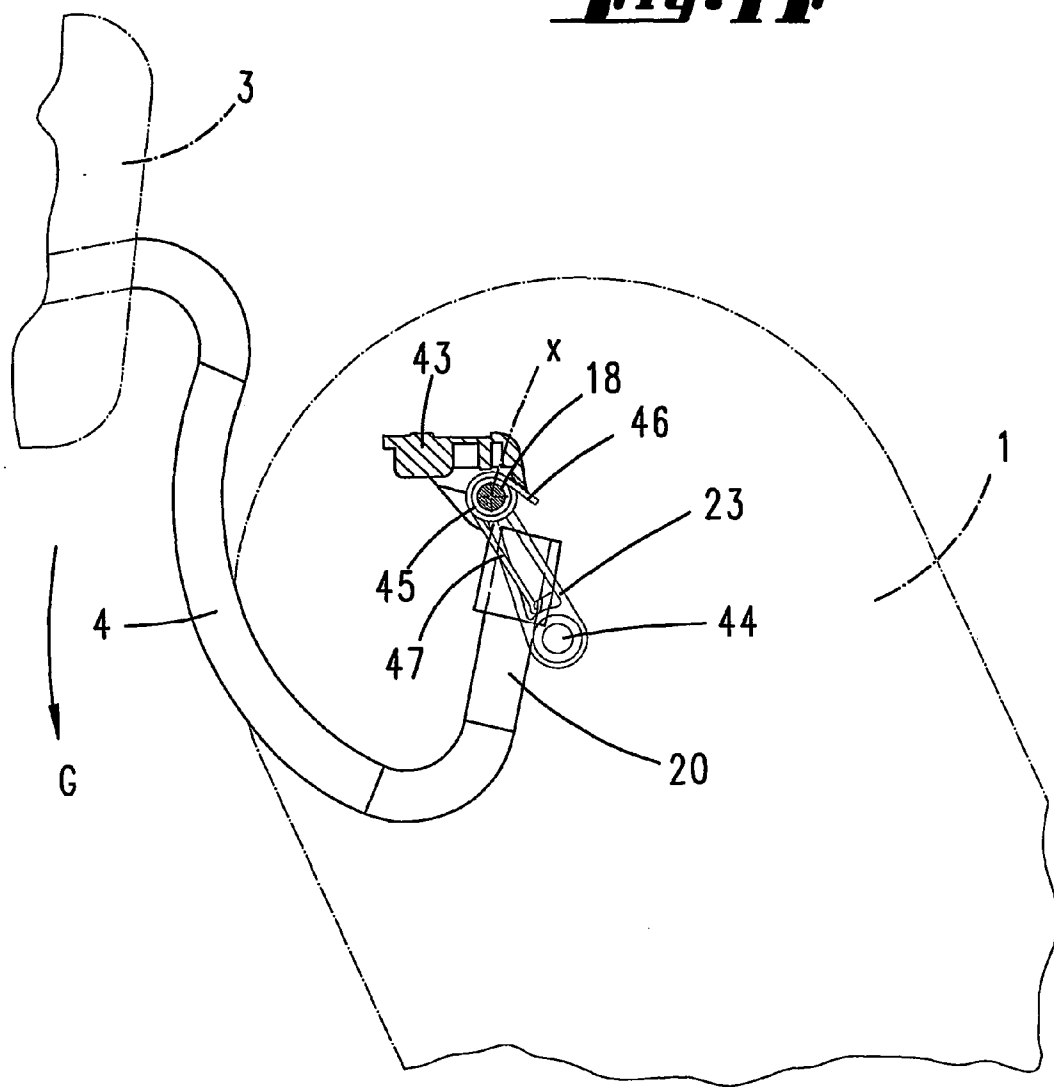
**Fig. 12**



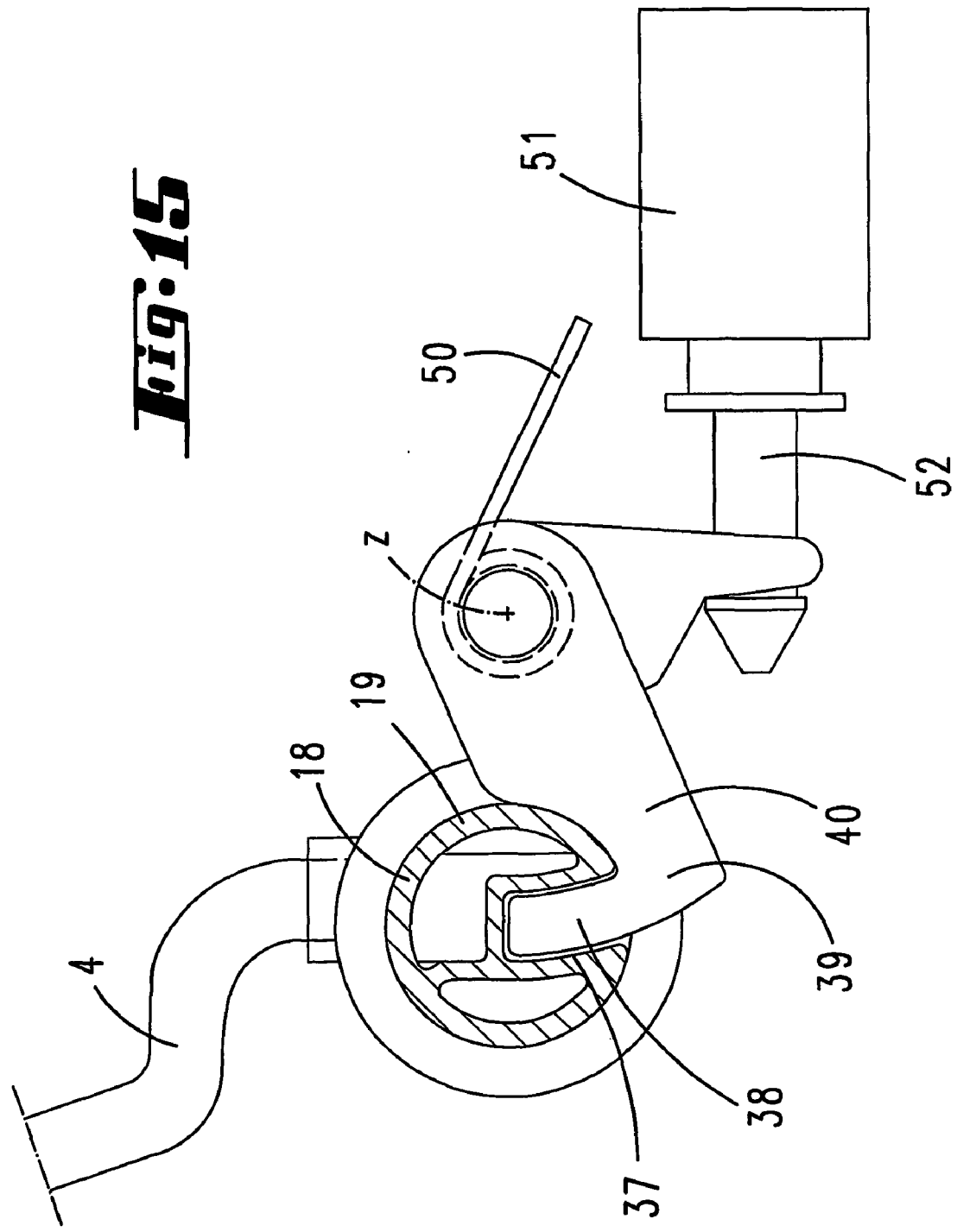
***Fig. 13***



***Fig. 14***



***Fig. 15***



## HEADREST WITH ADJUSTMENT MECHANISM

[0001] The invention relates in first instance to a headrest with adjustment mechanism, for motor vehicles, for example rear seat headrest, an angular position of the headrest relative to a backrest of a motor vehicle seat, to which the headrest is fitted, being adjustable and in which height adjustability is preferably provided, the headrest having two holding brackets which are plugged over a holding length into holding receptacles, the holding receptacles furthermore being pivotable together about a pivot pin in order to change the angular position.

[0002] Headrests for motor vehicles of the type under discussion are known. For example, driver and passenger seats have headrests which, in addition to a height adjustment, have an inclination adjustment, so that the headrest can be matched in terms of height and also in its angular position to the height and the sitting position of the person taking the seat. Furthermore, also known are rear seat headrests which can be adjusted in their angular position in such a manner that, if rear seats are not occupied, the corresponding rear seat headrests can, after being released, be pivoted into a concealed position, after which the driver obtains an improved view to the rear. A rear seat headrest of this type is known, for example, from DE 35 451 42 A1. If the rear seats are occupied, then the turned-down rear seat headrests can be transferred out of the concealed position into the position of use, for which purpose use is made of an electric motor which is associated with the headrest and on the output shaft of which a driving link is fixedly secured. It is furthermore known to plug the holding brackets of the headrest over a holding length into holding receptacles provided in the backrest.

[0003] In view of the above-described prior art, a technical problem with which the invention is concerned is to improve a headrest of the type under discussion in particular with regard to the holding of the same in the region of the holding receptacles with a high degree of stability in use.

[0004] This problem is solved first and foremost by the subject matter of Claim 1, this being based on the fact that the holding receptacles are connected by a connecting body having a cross-section corresponding at least to twice the diameter of a holding bracket, and that the holding receptacles are formed in the connecting body, the holding length corresponding to no more than three times the diameter of a holding bracket. As a result of a configuration of this nature, a space-saving solution which is stable in use is provided for the pivotable mounting of the headrest. It is therefore preferred for the clamping or holding length of the holding-bracket ends in the connecting body to correspond approximately to one to three times the bar diameter of the holding-bracket. Furthermore, a clamping length or holding length of 10 to 15 mm is provided. The connecting body which has the holding receptacles and is disposed in the backrest of the motor vehicle seat serves, in addition to the formation of the holding means, also as a preferably rigid connecting member between the holding brackets, as a result of which a torsionally rigid clamping of the two holding brackets with respect to each other can be achieved. As a consequence of this, the headrest can have two separate holding brackets in the form of individual bars which do not necessarily have to be connected by a cross-piece or the like in the region of the headrest or the headrest cushion. The solution according to

the invention provides a headrest which can be adjusted in angle to match it to the sitting position of the person taking the seat, and/or a rear seat headrest, which is pivotable out of a position of use into a concealed position and vice versa and the clamping or holding region of which is formed in a space-saving manner within the backrest of the motor vehicle seat. As a consequence of this, the solution according to the invention can be used both for the front seats and for the rear seats.

[0005] The invention also relates to an item according to the features of the precharacterizing clause of Claim 1, wherein it is proposed, for the advantageous development of a headrest of this type, that the holding receptacles are connected by a connecting body, and that a snap-in recess which interacts with a snap-in body is formed in the connecting body for the snap-in fixing of a pivoting position of the headrest, with, in the equivalent sense, the connecting body forming a rotary latch and the snap-in body forming a locking pawl. This achieves a definitive snap-in position of the headrest, in particular in the position of use.

[0006] The invention furthermore relates to a headrest with adjustment mechanism, for motor vehicles, preferably a rear seat headrest, the headrest being pivotable about a pivot pin out of a position of use into a concealed position using a weight force which is active on account of a weight of the headrest and, optionally, is displaceable by motor means out of the concealed position into the position of use. A headrest of this type is also known from DE 35 45 142 A1 mentioned at the beginning. In order to make a headrest of the generic type, preferably a rear seat headrest, more favorable in terms of control technology, and also to achieve a high degree of stability in use, it is proposed that a spindle drive is provided for displacing the headrest and that the weight force of the headrest is opposed by a spring. As a result of a configuration of this nature, the invention provides a headrest, preferably a rear seat headrest, of the generic type which, in addition to control technology advantages, is also distinguished by greater safety in the event of high loads occurring. A spindle drive serves to displace the headrest out of the position of use into the concealed position and vice versa. A particularly sensitive, stepless adjustment can be carried out. In order to actuate the spindle drive, on the one hand the threaded spindle itself may be driven, or, on the other hand, it is also possible for a threaded nut located on the threaded spindle to be driven. It is also possible for the driving electric motor to be in a fixed position or to pivot with the headrest. The electric motor which drives the threaded spindle can be of relatively modest dimensions. This leads to a physically compact structure and a weight saving. Moreover, the electric motor drive is oriented in such a manner that it is itself unaffected even by any high loads. In situations of this nature, the self-locking action of the spindle drive is utilized. For example, drive of the spindle can take place by means of a worm drive or a bevel gear drive. If a bevel gear drive is used, the ring gear can be seated on the spindle. This means that high adjustment forces can be applied even with low motor power. To minimize the driving forces required to adjust the headrest, the weight force of the headrest is opposed by a spring. In practice, this is such that, when the headrest is being adjusted out of its position of use into the concealed position, which is accompanied by the headrest pivoting, the weight of the headrest is used to load the spring such that the latter acts in the manner of a force accumulator.

In the concealed position of the headrest, therefore, the spring is loaded or stressed to a maximum. In the event of the headrest being displaced out of the concealed position into the position of use, therefore, this movement is boosted by the spring which has previously been loaded. Therefore, the drive substantially only has to overcome the friction in the system or in the spindle drive. This leads to a configuration of the drive with extremely small dimensions, which is eminently suitable for integration in an adjustable headrest. Furthermore, according to the invention it is provided that the spring moment which results from the spring exceeds the moment resulting from the weight force, at least over part of the pivoting travel. Therefore, in the event of the spring action deteriorating, as occurs after prolonged use, equilibrium in the moments is still always ensured. It is also ensured that, in the initial displacement of the headrest out of the concealed position, there is sufficient force to transfer the headrest into the position of use. The measure whereby the spring is a torsion spring has proven structurally advantageous. Such a spring can be produced at low cost and can be accommodated in an advantageous manner in the mechanism. The measure whereby the spring is wound around the pivot pin has proven particularly advantageous. Accordingly, a component which is already present is used to hold the spring. In a development of the subject matter of the invention, wherein the headrest has two holding brackets which are plugged over a holding length in holding receptacles, the holding receptacles furthermore being pivotable together about a pivot pin in order to change the angular position, it is provided that the holding receptacles are connected by a connecting body having a cross-section corresponding at least to twice the diameter of a holding bracket, and that the holding receptacles are formed in the connecting body, the holding length corresponding to no more than three times the diameter of a holding bracket. As a result of a configuration of this nature, the desired space-saving solution is further assisted by this being realized with a high degree of stability in the region of the clamping or holding of the holding brackets. It is therefore preferred, for the clamping or holding length of the holding-bracket ends in the connecting body to correspond approximately to one to three times the bar diameter of the holding-bracket. Furthermore, a clamping length or holding length of 10 to 15 mm is provided. The connecting body which has the holding receptacles and is disposed in the backrest of the motor vehicle seat serves, in addition to the formation of the holding means, also as a preferably rigid connecting member between the holding brackets, as a result of which a torsionally rigid clamping of the two holding brackets with respect to each other can be achieved. As a result, the headrest can have two separate holding brackets in the form of individual bars which do not necessarily have to be connected by a cross-piece or the like in the region of the headrest or of the headrest cushion.

[0007] The subjects of the rest of the claims are explained hereinbelow both in relation to the subject matter of Claim 1 and also in relation to the subjects of Claims 2 or 3 and, in addition, also in relation to a combination of one or more of the subjects of Claims 1, 2 and 3, but may also be important in their own right. It is thus further provided that the cross-section or cross-sectional portion of the connecting body that is located within a projection of the holding receptacles of the holding brackets onto one another has at least a dimensional size corresponding to twice the diameter

of a holding portion, as a result of which a compact, stable holding configuration is achieved. Thus, in the case of a holding-bracket diameter of, for example, 10 mm, the connecting body has within the projection of the holding receptacles onto one another at least a dimensional size of 20 mm, it being possible for the connecting body also to extend beyond the projection of the holding receptacles onto one another. To fix the holding brackets of the headrest, the holding receptacles, which accommodate the holding-bracket ends in a positive manner, preferably have fixing elements in order to secure the holding brackets from being pulled out of the holding receptacles. In a development of the subject matter of the invention, it is provided that the holding bracket is fixed outside a holding receptacle, for which purpose, by way of example, the holding bracket is fixed by means of a snap-in arm disposed on the connecting body. The said snap-in arm may engage positively, for example, in a notched groove of the holding bracket, in order to secure the latter in the withdrawal direction. A solution is also conceivable in which two snap-in arms acting in opposite directions are provided for fixing a holding bracket, with the opening cross-section which is provided for the passage of the holding bracket being slightly offset between the two snap-in arms in a projection with respect to the opening of the holding receptacle, so that, when the holding bracket is accommodated in the holding receptacle, it is fixed nonpositively by the snap-in arms acting radially on the outside on the holding bracket. As an alternative to this, it may be provided that the holding bracket is fixed within a holding receptacle, for example by means of a screw, for example a grub screw, acting radially on that end of the holding bracket which is plugged into the holding receptacle, or, for example, by provision of a snap-in ball which interacts with an annular groove of the holding-bracket end and is disposed in the holding receptacle.

[0008] The invention also relates to a headrest with adjustment mechanism, for motor vehicles, for example rear seat headrests, an angular position of the headrest relative to a backrest of a vehicle seat, to which the headrest is fitted, being adjustable and in which height adjustability is preferably provided, the headrest having two holding brackets. In order to form a headrest of the type in question in a space-saving manner and with a high degree of stability in use, in particular in the region of the mechanism adjusting the angular position, it is proposed that the holding brackets merge integrally into a holding portion of the pivot pin. The pivot pin may be formed as a solid part in the form of a connecting body between the holding brackets, or, further, for example, in the form of a cast part on which the holding brackets are integrally formed. As a result of a configuration of this nature, a space-saving solution which is stable in use is provided in the region of the adjustment mechanism for the headrest, with an interface which is changed compared with the customary headrest installation known from the prior art, which interface is now formed in the region of the headrest cushion.

[0009] The subjects of the rest of the claims are explained hereinbelow in relation to the subject matter of Claim 1 and in relation to the subject matter of Claim 2 and in relation to the subject matter of Claim 12 and, in addition, also in relation to a combination of claims mentioned above, but may also be important in their own right. It is thus further proposed that a geometrical axis of the pivot pin extends within the connecting body, it being possible for the geo-

metrical axis to be disposed in such a manner that the holding brackets intersect the latter, while entirely or partially passing through the connecting body. A crossing of holding bracket and pivot pin in a projection is also conceivable. It is furthermore preferred for a spindle drive to be provided for the angular adjustment of the headrest, which spindle drive, when the headrest is formed as a rear seat headrest, in particular according to the subject matter of Claim 2, can be used both for the displaceability by motor means of the headrest out of a concealed position into the position of use and also for the angular adjustment of the headrest in the position of use. In this connection, a stepless adjustment by electric motor via a spindle drive is particularly suitable, the spindle drive being formed to be self-locking, so that the angular position achieved for the headrest can be automatically retained. It is furthermore preferred that, when the headrest is formed as a rear seat headrest, the adjustment of the same out of the position of use into the concealed position also takes place by electric motor via the spindle drive. Alternatively, it is provided, in particular in the case of a rear seat headrest, that a pivoting position of the headrest can be fixed by snapping in, in particular the position of use after the headrest has been pivoted out of the concealed position. For example, a snap-in recess which interacts with a snap-in body can be formed in the pivot pin for the snap-in fixing, with, in the equivalent sense, the pivot pin or the connecting body forming a rotary latch and the snap-in body which interacts with the latter forming a locking pawl. As a result of a configuration of this nature, a definitive snap-in position of the headrest in the position of use is realized. According to the invention, the pivoting of the headrest into the snap-in position can take place by means of a spindle drive driven by electric motor, this proving advantageous in particular in the case of the rear seat headrest solution discussed, since, for example, by means of a seat occupation sensor, the rear seat headrest which is located in the concealed position may be displaced by electric motor into the position of use, in which it is secured by snapping in. However, a solution in which the headrest can be pivoted into the snap-in position by manual actuation is also conceivable. The snap-in body can also be brought manually into a release position, which snap-in body can be formed, for example, as a snap-in pawl which can be pivoted away, or in the form of a pin which can be displaced away radially from the pivot pin. The displacement of the snap-in body into the release position can take place, for example, manually via a lever in close proximity or Bowden cable. Also conceivable, for example, is an electric or electropneumatic solution, in which one or more of the rear seat headrests are released from the snap-in position from the driver's seat, after which they drop into the concealed position, optionally assisted by the spindle drive or else solely by their own weight. In a development of the subject matter of the invention, it is provided that the connecting body is formed as a flat body, with an extent in width longitudinally corresponding in cross-section to a multiple of the dimension of the narrow end, and with it furthermore being possible for the cross-section of the flat body to also be formed to be irregular. In addition, the connecting body may also be formed as a polygon, preferably a regular polygon, for example a regular hexagon in cross-section. The connecting body may also be formed as a cast part or else as a bent sheet-metal part. So that, in the event of a possible accident, the energy taking effect in the

headrest is not passed on without hindrance into the adjustment mechanism, in particular into the angular adjustment mechanism, it is provided that a body with a predetermined deformation portion is provided in the force path of the headrest adjustment or of the headrest support, which body is formed in such a manner that a controlled plastic deformation is achieved upon increased energy taking effect in the headrest. The energy is therefore absorbed by work of deformation. For example, the predetermined deformation portion can be formed for this purpose in the snap-in body. As an alternative to this, the predetermined deformation portion may also be formed in a pivoting drive of the headrest, in particular in a pivot lever of the pivoting drive. Furthermore, there is alternatively the possibility of the predetermined deformation portion being formed in an adjustment spindle of the pivoting drive. If the predetermined deformation portion is formed in the snap-in body or in the pivot lever of the pivoting drive or in another, substantially platelike part of the pivoting mechanism that is disposed in the force path, then it is provided that the predetermined deformation portion is formed by cross-sectional weakenings. For example, compression zones in the form of notches with an open edge may be provided. If the predetermined deformation portion is formed in the adjustment spindle, then it is proposed that the predetermined deformation portion is formed by fashioning the adjustment spindle as a yielding spindle, with the diameter and the material of the adjustment spindle being selected in such a manner that a controlled deformation of the adjustment spindle is achieved, but the latter does not tear off. This configuration is suitable in the case of solutions in which the adjustment mechanism is formed in such a manner that, in the event of an accident, the adjustment spindle is subjected to a tensile stress. Furthermore, it is proposed that the mounting of the connecting body and/or of the pivot pin is divided in two, which has proven advantageous in particular in the case of an integral configuration of holding bracket and pivot pin or connecting body. In addition, it is proposed according to the invention that the holding brackets are connected in the region of the headrest by a displacement yoke, to which the headrest is also secured, and that the displacement yoke can be displaced by means of a spindle drive. A combined angle and height adjustment of the headrest by electric motor is therefore achieved, with the mechanism for the angle adjustment being disposed in the region of the rear seat back and the mechanism for the height adjustment being disposed within the headrest. The two mechanisms are in first instance activatable independently of each other, with it furthermore being possible for the spindle-adjustable height setting of the headrest also to be used in conjunction with a—as described—manually actuable adjustment of the headrest, in particular rear seat headrest, out of a concealed position into the position of use. It is furthermore preferred in this regard for an electric motor drive of the spindle drive to be mounted in the displacement yoke. Finally, it is provided that an electric motor drive for the height adjustment and an electric motor drive for the inclination adjustment are coupled electronically for the coordinating movement, the provision of the pivot pin of the headrest for the inclination adjustment within the rear seat back furthermore proving advantageous, since by this, a relatively great lever arm for the angular adjustment of the headrest is achieved, as a result of which there is easier guidance of the headrest impact surface. A pivoting of the

headrest is sufficient for guiding purposes, at least over a certain angular region, without having to adjust the headrest in height.

[0010] The invention is explained in more detail below with reference to the accompanying drawings which merely illustrate various exemplary embodiments. In the drawings:

[0011] **FIG. 1** shows, in a diagrammatic, partially cutaway perspective illustration, a motor vehicle backrest with associated headrest according to the invention, which headrest can be adjusted both in angle and height by electric motor, relating to a first embodiment with regard to the angular adjustment,

[0012] **FIG. 2** shows a detailed perspective illustration of the headrest with integrated electric motor height adjustment, partially cutaway;

[0013] **FIG. 3** shows a detailed perspective illustration of the headrest mount in the backrest region with associated angle adjustment mechanism, relating to a position of use of the headrest;

[0014] **FIG. 4** shows the section on line IV-IV in **FIG. 3**;

[0015] **FIG. 5** shows a further perspective illustration according to **FIG. 3**, but with a changed viewing direction;

[0016] **FIG. 6** shows an illustration corresponding to **FIG. 3**, relating to the not-in-use position or concealed position of the headrest, for example when disposed in a rear seat back;

[0017] **FIG. 7** shows a perspective illustration of the angle adjustment mechanism, relating to a second embodiment;

[0018] **FIG. 8** shows a third embodiment of the angle adjustment mechanism in perspective illustration;

[0019] **FIG. 9** shows a perspective a detailed illustration of a connecting body for holding the holding brackets of the headrest, in a further embodiment;

[0020] **FIG. 10** shows a perspective a detailed illustration, corresponding to **FIG. 9**, of a connecting body which merges integrally into the holding brackets;

[0021] **FIG. 11** shows a cross-section through a connecting body of the adjustment mechanism, relating to a further embodiment which can be fixed by snapping in;

[0022] **FIG. 12** shows a further cross-sectional illustration, relating to the snap-in fixing of the connecting body in a further embodiment,

[0023] **FIG. 13** shows a cross-section through the adjustment mechanism of a rear seat headrest according to a further embodiment, relating to the position of use of the headrest;

[0024] **FIG. 14** shows an illustration comparable to **FIG. 13**, but relating to the concealed position;

[0025] **FIG. 15** shows a further cross-sectional illustration, relating to a further embodiment of a snap-in-fixing.

[0026] A first embodiment of a headrest arrangement for a motor vehicle is illustrated and described in first instance with regard to **FIG. 1**, it being possible for this embodiment to be used both for rear seats and for front seats.

[0027] At its upper end, the backrest **1** of the motor vehicle seat **2** carries a headrest, which is designated as a whole by the numeral **3**. The headrest has a cushion body **5**, which is carried by two holding brackets **4** running parallel to each other, for supporting the back of the head of a person on the

motor vehicle seat **2**. The holding brackets **4** pass through the backrest **1** and are mounted pivotably within this backrest **1** to enable the angular position of the headrest **3** to be adjusted. The pivoting mechanism, which is integrated in the backrest **1**, carries the reference numeral **6** overall.

[0028] The headrest **3** is formed to be height-adjustable. For this purpose, the holding brackets **4** are in first instance connected in the region of the cushion body **5** by a displacement yoke **7** which is guided by the holding brackets **4** which extend in parallel, on which displacement yoke an electric motor drive **8** is mounted. The latter acts via a gear drive (not illustrated specifically) on a nut (likewise not illustrated), which can be displaced by screw action, the nut being on a spindle **9** which extends centrally between the holding brackets **4**. The spindle **9** is held on a fixed yoke **10**, which connects the holding brackets **4** in the free end region, and passes through a sliding bushing **11** formed in the displacement yoke **7**. That free end region of the spindle **9** which protrudes downward over the sliding bushing **11** is in engagement with the nut driven by electric motor. The cushion body **5** of the headrest **3** is secured on the displacement yoke **7**.

[0029] An electric, spindle-actuable height adjustment of the headrest **3** can be achieved by means of the electric motor drive **8**, with the displacement yoke **7** being displaced together with the cushion body **5** along the holding brackets **4** by rotational actuation of the nut interacting with the spindle **9**.

[0030] **FIGS. 3 to 6** show a first embodiment of the pivoting mechanism **6** which can be integrated in the backrest **1**. This pivoting mechanism has in first instance a mounting base plate **12**, which is C-shaped in outline and the C-limbs **13** of which, forming side walls, have openings **15** which open toward the end peripheral edge facing away from the C cross-piece **14** and are in part circular form.

[0031] At the end, the upper C-limb portions **16** which are exposed by this means form bearings **17** for a connecting body **19** forming a pivot pin **18**.

[0032] In the exemplary embodiment illustrated, the connecting body **19** is formed as a solid part which is formed as a regular hexagon in cross-section and protrudes on both sides beyond the bearing **17**. In the vicinity of the two free ends of the connecting body **19**, the latter is passed through by holes which run perpendicularly to the geometrical axis *x* of the connecting body **19** or of the pivot pin **18**, in order to form holding receptacles **20**. Bushings **21**, preferably bushings of plastics material, are situated in the holding receptacles **20** and their inside diameter is matched to the outside diameter of the holding brackets **4** of the headrest **3**.

[0033] In the exemplary embodiment illustrated, the holes forming the holding receptacles **20** are provided as through holes. However, a configuration in which the holding receptacles **20** are formed as blind holes is also conceivable.

[0034] The connecting body **19** connecting the holding receptacles **20** has at least a cross-section corresponding to twice the diameter of a holding bracket **4**, the cross-section or cross-sectional portion of the connecting body **19** that is located within a projection of the holding receptacles **20** onto one another furthermore having at least a dimensional size corresponding to twice the holding-portion diameter. Furthermore, the holding length corresponds to not more than three times the diameter of a holding bracket **4**. Thus, given a holding-bracket diameter *d* of 10 mm, for example,

a holding length  $l$  of 15 to 20 mm is provided, with a dimensional size  $a$  of the cross-sectional portion of the connecting body 19, which portion is located within the projection of the holding receptacles 20 onto one another, of approximately 20 mm in the exemplary embodiment.

[0035] The holding brackets 4 are also fixed within the holding receptacles 20, for which purpose, in the exemplary embodiment illustrated, at the end of the connecting body 19, fixing screws 22 which are oriented on the geometrical axis  $x$  act radially on the outer wall of the holding brackets 4.

[0036] Adjacent to one of the C-limbs 13 of the mounting base plate 12, a pivot lever 23 is secured in a rotationally fixed manner on the connecting body 19 forming the pivot pin 18, the free lever end of which pivot lever extends laterally into the region of the associated opening 15 of the mounting base plate 12 and is coupled here via a pin body 24, which extends parallel to the geometrical axis  $x$  of the connecting body 19, to a sliding bushing 25. The latter is penetrated by a spindle 26 which, approximately in the transition region from the cut-away C-limb portions 16 to the C cross-piece 14, is mounted to be tiltable about an axis  $y$  which is oriented parallel to the geometrical axis  $x$  of the connecting body 19 and extends approximately diagonally between the C-limbs 13.

[0037] An electric motor drive 27 acting on a nut (not illustrated specifically), which interacts with the spindle 26, is secured on the sliding bushing 25.

[0038] The actuation of the electric motor effects a displacement by screw action of the nut, which is driven by the said electric motor, along the spindle 26 with the sliding bushing 25 being carried along, which results in a rotational displacement of the connecting body 19 or of the pivot pin 18 via the pin body 24 and the pivot lever 23. The holding brackets 4, and therefore the headrest 3, are pivoted into the desired position via the said connecting body or pivot pin. In this connection, both small angular adjustments of the headrest 3 and also, when the pivoting mechanism 6 is disposed in the region of a motor vehicle rear seat, the complete pivoting of the headrest 3 up out of or down into a concealed position can be achieved via the electric motor drive 27.

[0039] For the absorption of energy effective in the case of a possible accident, the pivot lever 23 has predetermined deformation portions 28 in the form of V-shaped cross-sectional weakenings which are open at the edge. As a result of a configuration of this nature, this region is plastically deformed in a controlled manner under the effect of high energy in the pivoting mechanism 6 (see arrow  $u$ ). Furthermore, the pivot lever 23 is supported over the entire pivoting travel on the outer surface of the associated C-limb 13 via an integrally formed extension arm 29.

[0040] FIG. 7 illustrates a further embodiment of the pivoting mechanism 6. This is similar to the previously described mechanism in pertinent features, so that identical components carry identical reference numerals. In contrast to the previously described exemplary embodiment, in this embodiment the pivot lever 23 is formed with two limbs, through the formation of a U-profile, the free ends of the U-limbs of which surround the pivot pin 18 or the connecting body 19 in a rotationally fixed manner. In addition, the

mounting base plate 12 carries a bearing body 30 for the formation of further bearings 17 in the vicinity of the end regions of the connecting body 19.

[0041] One substantial difference resides in the fixing of the holding brackets 4 in the holding receptacles 20. This does not take place, as previously described, within the holding receptacles 20, for example by means of screws, but rather outside the holding receptacles 20, for which purpose two snap-in arms 31 which act in opposite directions in the direction of a holding-bracket body axis are secured on the connecting body 19 outside the holding receptacles 20 and counterfix the associated holding bracket 4 nonpositively in the associated holding receptacle 20.

[0042] FIG. 8 shows a further embodiment of a pivoting mechanism 6, in which, in contrast to the previously described exemplary embodiments, the spindle 26 is acted upon directly via the electric motor drive 27 and a nut 32, which can be displaced by screw action on this spindle 26, acts on the said spindle for the pivoting displacement of the connecting body 19 or of the pivot pin 18.

[0043] In this exemplary embodiment, the connecting body 19 forming the pivot pin 18 is formed as a bent sheet-metal part, with holding receptacles 20 being formed on both sides at the end and that portion of the connecting body 19 which is formed between them being formed in a substantially stretched-out manner as a double-walled flat body component. In this embodiment too, the holding length  $l$  in the region of the holding receptacle 20 is not more than three times the holding-bracket diameter  $d$ . Thus, given a diameter  $d$  of 10 mm, a holding length  $l$  of approximately 15 mm is provided.

[0044] On the flat side facing the mounting base plate 12, the bent sheet-metal part forming the connecting body 19 carries two triangular plates 33 which are at a spacing from each other, form pivot levers 23 and are mounted on the mounting base plate 12, at the end of two spaced apart C-limbs 13 thereof, in a manner such that they pivot about a geometrical axis  $x$ . In the free end regions of the triangular plates 33, the nut 32 engages eccentrically to the axis  $x$  over pins 34.

[0045] That end of the spindle 26 which faces away from the connecting body 19 is held in a freely rotating manner in a U-profile 35 which is mounted in a tilting manner about a tilt axis  $y$  on the C-limbs 13 of the mounting base plate 12 (the pin body defining the geometrical axis  $y$  is not illustrated).

[0046] On the upper side of the U-profile 35, an electric motor drive 27 engages on the spindle 26. An actuation of the spindle effects the displacement by screw action of the nut 32 along the spindle axis, whereupon, with tilting displacement at the same time of spindle 26, the connecting body 19 is pivoted about the geometrical axis  $x$ .

[0047] FIGS. 9 and 10 illustrate further exemplary embodiments of connecting bodies 19 forming pivot pins 18. These are formed as cast parts. As can be gathered in the illustration in FIG. 9, the holding brackets 4, and therefore also the holding receptacles 20, may also have a rectangular cross-section in a departure from the circular cross-sections illustrated in the other exemplary embodiments.

[0048] Furthermore, as illustrated in FIG. 10, the holding brackets 4 may also merge integrally into a holding portion

36 of the pivot pin 18. As a result of this, in this configuration the interface between headrest 3 and pivoting mechanism 6 is displaced out of the region of the backrest into the region of the headrest, with recourse furthermore being made, in the case of an embodiment of this type, to bearings which are divided in two for the pivot pin 18.

[0049] In the case of the electromechanical spindle-drive pivoting adjustment of the headrest 3, a self-locking drive is preferably selected. However, there is also the possibility of fixing in particular the pivoting position of the headrest 3, furthermore in particular the position of use of a rear seat headrest 3, by snapping in. This embodiment is conceivable in particular also for a manually actuated pivoting of the headrest 3 into the snap-in position. FIGS. 11 and 12 show exemplary solutions. In first instance, the pivot pin 18 or the connecting body 19 is provided with a snap-in recess 37 which extends in the axial direction over a length of 30 to 60 mm and into which, in the snap-in position, for example in the position of use of a rear seat headrest, there engages the snap-in nose 38 of a pivotably mounted snap-in body 39. The length of the snap-in nose 38, measured in the axial direction of the connecting body 19 or of the pivot pin 18, is matched to the length of the snap-in recess 37.

[0050] In the embodiment illustrated in FIG. 11, the snap-in body 39 is formed as a locking pawl which can be pivoted about an axis z oriented parallel to the geometrical axis x of the connecting body 19 or of the pivot pin 18, the locking pawl 40 being loaded into the snap-in position according to FIG. 11 by a spring (not illustrated). In this case, the pivot pin 18 or the connecting body 19 takes on the function of a rotary latch, with the preferred use of a single-piece, solid connecting body 19 according to the first embodiment in FIGS. 1 to 6, which connecting body 19 serves at the same time for the mounting of the bracket.

[0051] Snap-in recess 37 and snap-in nose 38 may be formed in such a manner that the snap-in position can be taken up and also released again by means of an electric motor drive. However, it is also conceivable for the snap-in body 39 and the locking pawl 40 to be brought manually into a release position, for example by the engagement of a Bowden cable on the locking pawl 40.

[0052] As an alternative, the snap-in body 39 according to the illustration in FIG. 12 may also be formed as a spring-biased snap-in pin 41 which acts radially in the direction of the pivot pin 18 or the connecting body 19 and, in the same manner as in the previously described exemplary embodiment, engages in a snap-in recess 37 of the connecting body 19 or of the pivot pin 18. As illustrated, the release position can take place here via a manually actuatable release lever 42 which displaces the snap-in pin 41 radially outward out of the snap-in recess 37.

[0053] FIGS. 13 and 14 show an exemplary embodiment of a rear seat headrest 3 which can be pivoted by manual actuation or, according to one of the previously described exemplary embodiments, by electromechanical operation of the spindle, out of a concealed position into a position of use and vice versa. In this case, a supporting frame is designated by the numeral 43. A pivot lever 23 can be displaced about the geometrical axis x of the pivot pin or of the connecting body 19. The displacement may take place here in the same manner as in the previously described embodiments via a spindle drive (not illustrated). The pivot lever 23 is carrier

for a positively locking pin 24 associated with the holding receptacle 20. Via this positively locking pin, a spring 45 configured as a torsion spring sits on the geometrical axis x. The coils of this spring 45 surround the pivot pin 18. One of the spring limbs 46 is supported on the supporting frame 45 while the other spring limb 47 acts on the pivot lever 23 with the effect of a torque acting in the clockwise direction.

[0054] If the rear seat headrest 3 is pivoted out of its position of use illustrated in FIG. 13 into the concealed position according to FIG. 14, then the weight force G is opposed in FIG. 14 by the spring 45. This spring accordingly operates as a force accumulator spring. This means that, during the return of the headrest 3 from the concealed position into the position of use, the spring 45 acts as a boost. This affords the advantage that the drive basically only has to overcome the friction in the adjustment mechanism.

[0055] As can furthermore be gathered from the illustrations in FIGS. 13 and 14, in this exemplary embodiment too, the holding length l is less than three times the diameter d of the holding bracket 4, the holding receptacles 20 furthermore being formed in the connecting body 19 forming the pivot pin 18. This connecting body 19 has a cross-section corresponding at least to twice the holding-bracket diameter d.

[0056] FIG. 15 shows a further alternative configuration with a snap-in fixing of the headrest in the position of use. In this case too, as in the exemplary embodiment in FIG. 11, the connecting body 19 is provided with a radial snap-in recess 37 into which, in the position of use, a snap-in nose 38 of a locking pawl 40, which can be pivoted about an axis x, enters in a locking manner. This locking pawl 40 is loaded into the locking position by means of a leg spring 50.

[0057] The releasing of the position of use secured by snapping-in takes place by actuation of a servomotor 51, the axially acting servocomponent 52 of which is retracted, pivotally carrying along the locking pawl 40. In the course of the pivoting displacement of the locking pawl 40, the snap-in nose 38 leaves the snap-in recess 37, after which the connecting body 19 or the pivot pin 18 is released. After this, the headrest drops into the concealed position under its own weight.

[0058] After release of the catch, the servo component 52 is displaced back into the basic position according to FIG. 15. When the headrest is set upright by manual actuation, the snap-in nose 38, which rests in a spring-loaded manner on the outer surface of the connecting body 19, drops into the snap-in recess 37 again.

[0059] All features disclosed are (in themselves) pertinent to the invention. The disclosure content of the associated/attached priority documents (copy of the prior application) is hereby also included in full in the disclosure of the application, also for the purpose of incorporating features of these documents in claims of the present application.

We claim:

1-34. (canceled)

35. Headrest (3) with adjustment mechanism, for motor vehicles, including rear seat headrest, wherein an angular position of the headrest (3) relative to a backrest (1) of a motor vehicle seat (2), to which the headrest (3) is fitted, is adjustable and in which height adjustability is provided, the headrest comprising: two holding brackets (4) which are

plugged over a holding length (1) into holding receptacles (20), the holding receptacles (20) furthermore being pivotable together about a pivot pin (18) in order to change the angular position; wherein the holding receptacles (20) are connected by a connecting body (19) having a cross-section corresponding at least to twice the diameter (d) of a holding bracket (4), and in that the holding receptacles (20) are formed in the connecting body (19), the holding length (1) corresponding to no more than three times the diameter (d) of a holding bracket (4).

36. Headrest according to claim 35, wherein the holding receptacles (20) are connected by a connecting body (19), and in that a snap-in recess (37) which interacts with a snap-in body (39) is formed in the connecting body (19) for the snap-in fixing of a pivoting position of the headrest (3).

37. Headrest with adjustment mechanism, for motor vehicles, including rear seat headrest, wherein the headrest (3) is pivotable about a pivot pin (18) out of a position of use into a concealed position using a weight force (G) which is active on account of a weight of the headrest (3) and being displaceable by motor means at least out of the concealed position into the position of use, the headrest comprising: a spindle drive for displacing the headrest (3), and a spring (45) that opposes the weight force (G) of the headrest (3).

38. Headrest according to claim 37, wherein a moment of the spring exceeds the moment resulting from the weight force (G), at least over part of the pivoting travel.

39. Headrest according to claim 37, wherein the spring (45) comprises at least one of a torsion spring or a torsion bar or a tension spring or a compression spring.

40. Headrest according to claim 37, wherein the spring (45) is wound around the pivot pin (18).

41. Headrest according to claim 37, wherein the headrest (3) has two holding brackets (4) which are plugged over a holding length (1) into holding receptacles (20), the holding receptacles (20) furthermore being pivotable together about a pivot pin (18) in order to change the angular position, wherein the holding receptacles (20) are connected by a connecting body (19) having a cross-section corresponding to at least twice the diameter (d) of a holding bracket (4), and in that the holding receptacles (20) are formed in the connecting body (19), the holding length (1) corresponding to no more than three times the diameter (d) of a holding bracket (4).

42. Headrest according to claim 37, wherein the cross-section or cross-sectional portion of the connecting body (19), which is located within a projection of the holding receptacles (20) for the holding brackets (4) onto one another, has at least a dimensional size corresponding to twice the diameter of a holding portion.

43. Headrest according to claim 41, wherein the holding bracket (4) is fixed outside a holding receptacle (20).

44. Headrest according to claim 41, wherein the holding bracket (4) is fixed by means of a snap-in arm (31) disposed on the connecting body (19).

45. Headrest according to claim 41, wherein two snap-in arms (31) acting in opposite directions are provided for fixing a holding bracket (4).

46. Headrest according to claim 45, wherein the holding bracket (4) is fixed within a holding receptacle (20).

47. Headrest (3) with adjustment mechanism, for motor vehicles, including a rear seat headrest, wherein an angular position of the headrest (3) relative to a backrest (1) of a motor vehicle seat (2), to which the headrest (3) is fitted, is adjustable and in which height adjustability is provided, the headrest (3) having two holding brackets (4), and wherein

the holding brackets (4) merge integrally into a holding portion (36) of a pivot pin (18).

48. Headrest according to claim 35, wherein a geometrical axis (x) of the pivot pin (18) extends within the connecting body (19).

49. Headrest according to claim 47, further comprising a spindle drive for an angular adjustment of the headrest (3).

50. Headrest according to claim 49, wherein a pivoting position of the headrest (3) can be fixed by snapping in.

51. Headrest according to claim 50, further comprising a snap-in recess (37) which interacts with a snap-in body (39), and is formed in the pivot pin (18) for the snap-in fixing.

52. Headrest according to claim 50, wherein the headrest (3) can be pivoted into the snap-in position by manual actuation.

53. Headrest according to claim 51, wherein the snap-in body (39) can be brought manually into a release position.

54. Headrest according to claim 35, wherein the connecting body (19) is formed as a flat body.

55. Headrest according to claim 35, wherein the connecting body (19) is formed as a polygon.

56. Headrest according to claim 35, wherein the connecting body (19) is formed as a cast part.

57. Headrest according to claim 35, wherein the connecting body is formed as a bent sheet-metal part.

58. Headrest according to claim 35, wherein a body with a predetermined deformation portion (28) is provided in the force path of the headrest adjustment or of the headrest support.

59. Headrest according to claim 35, wherein the predetermined deformation portion (28) is formed in the snap-in body (39).

60. Headrest according to claim 58, wherein the predetermined deformation portion (28) is formed in a pivoting drive of the headrest (3).

61. Headrest according to claim 58, wherein the predetermined deformation portion (28) is formed in a pivot lever (23) of the pivoting drive.

62. Headrest according to claim 58, wherein the predetermined deformation portion is formed in an adjustment spindle (26) of the pivoting drive.

63. Headrest according to claim 58, wherein the predetermined deformation portion (28) is formed by cross-sectional weakenings.

64. Headrest according to claim 58, wherein the predetermined deformation portion (28) is formed by fashioning the adjustment spindle (26) as a yielding spindle.

65. Headrest according to claim 41, wherein the mounting of the connecting body (19) and/or of the pivot pin (18) is divided in two.

66. Headrest according to claim 35, wherein the holding brackets (4) are connected in the region of the headrest (3) by a displacement yoke (7), to which the headrest (3) is also secured, and in that the displacement yoke (7) can be displaced by means of a spindle drive.

67. Headrest according to claim 66, wherein an electric motor drive (8) for the spindle drive is mounted in the displacement yoke (7).

68. Headrest according to claim 35, wherein an electric motor drive (8) for the height adjustment and an electric motor drive (27) for the inclination adjustment are coupled electronically for a coordinating movement.