ABSTRACT

A kneeling chair is provided with tilting seat plate and tilting knee plate with rotational tilt of the seat plate enabling the sitting to individual to sit back on a generally horizontal oriented or partially inclined positions of the seat without leaving the chair. The range of tilt is controllable by varied location of the axis of rotation and stops which can be adjusted. The rotation may be dampened by a brake apparatus provided.
TILTING SURFACE KNEELING CHAIR

CROSS REFERENCE TO RELATED APPLICATION

This Application claims the benefit of prior copending U.S. Provisional Application No. 61/054,390 filed May 19, 2008.

BACKGROUND OF THE INVENTION

The invention relates to tilting surfaces for seats and supports on kneeling chairs.

Background of the Invention-Prior Art

A kneeling chair provides two sites of support for the sitting person. The person sits upon an inclined plane with the angle of the legs and torso (at the hips) held in a more open angle than the typical sitting angle of approximately 90 degrees. The weight of the person is carried through the spine into the pelvis ischial bones which normally bear the weight of sitting, however the inclined sitting plate requires that a second vector of resistance be provided to prevent skidding off of the incline. This second vector site of weight bearing is carried through the knees and lower leg which contact a kneel plate which is inclined toward the sitting plate.

The knees are flexed somewhat in the manner of kneeling, however the angle of the flexed knees is not usually so acute as the angle needed for kneeling on the ground.

Another difference from the posture of typical kneeling on the ground, is that the lower leg also contacts the kneel plate along the bony anterior tibial region of the lower leg.

Since the knee and tibia are elevated above floor level upon the kneel plate, the ankles and feet are relatively freed from any duty of support and free to hang loosely tucked under the body of the kneeling-sitting individual.

It is generally believed that the benefit of this partial kneeling posture, with more open hip angle, allows the sitting individual to assume a spinal curvature with more lumbar extension, or lordosis which tends more toward the spinal curvature of ordinary standing. Typically a kneeling chair does not provide a back support and this is founded on the principle that the sitting individual provides a natural best alignment of the skeleton using a dynamic balance of the existing muscle, tendon, and ligamentous stabilizers. Therefore a back support is rendered moot by a configuration which removes the restriction of sitting on the typical chair, which provides a nearly horizontal sitting plate. Rather than providing a back support which actually limits subtle back motions, a kneeling individual is free to move the back according to unconscious choices motivated by comfort and intrinsic muscle tone.

Some would describe the center of balance chosen by the kneeling sitter as being analogous to the unconscious balancing carried out by a bicyclist finding the center of gravity on a coasting bike. The principle of freeing the sitter to seek out one’s own balance is also the theme of those who advocate a simple large ball as ideal for seated tasks. The so called “sitting ball” or “exercise ball” has also been referred to as a “stability ball” which would seem to be a conundrum if not for the internal postural stability that seems to be gained by its devotees. The sitter upon an exercise ball is free to migrate in minor ways from the top center location, as long as the body is braced by feet upon the floor. The directions of migration to relieve the tedium of a single posture are usually forward and back which may be analogous to rocking in a chair, but also some lateral tilting allows a shift to more or less weight bearing to one hemiregion of the pelvis.

Ordinary chair sitters also seek variance for leg posture as well as for spinal posture. Chair sitters may back away from a task to cross legs, or lean into a task to totally escape a back support for a while. Despite the shifting postures available upon an exercise ball, the sitter tends to keep both feet well planted upon the floor for sufficient stability or sometimes cross the legs below the knee level. The kneeling chair sitter is also able to deploy other variances such leaning laterally, by shifting to a solitary leg for the knee level support and propping the freed leg at other angles.

Kneeling chairs have at least two frame configurations which are shown as prior art figures in the specifications. Kneeling chairs known to the inventor provide two support plates which are a sitting plate and a kneel plate, both of which are fixed in orientation.

The fixed orientation presents a fundamental limit to sitting back in the manner of an ordinary stool having no back support. In the posture of sitting on a stool both legs would be freed for a while from the incessant duty of at least one knee (and tibia) having to provide a counter resistance to the tendency of upper body to slide down off of the inclined sitting plate. Such a standard stool sitting posture attempted on a fixed inclined plane becomes quickly uncomfortable.

It is a tenet of the advocates of kneeling chair that the user is freed from back support by the self training and freedom of choice residing in the body and mind of the user and the user is deemed capable of maintaining a posture of choice. To the contrary, it is the kneeling chair with fixed inclined surfaces that demands the most incessant deployment of a rather narrow range of posture (even if that posture has good long term attributes and benefits). When the user tires of that beneficial posture the user must leave the chair entirely unless the chair is modified to accommodate excursions away from the dictates of a fixed chair with fixed angles.

OBJECTS OF THE INVENTION

The invention sets out to provide a kneeling chair with a range of positions for its sitting plate and its kneeling plate which are not fixed in relation to the chair frame.

The weight bearing plates provides variance in tilting of both the kneel plate and the sitting plate according to the postures assumed by the sitter and the anatomy of the sitter.

The sitting plate will provide a range from a kneeling incline in a most forward tilt in kneeling and a somewhat horizontal position for sitting back as upon a stool.

Rather than simply hinging either plate to a frame, the adjustable features are provided with attention to safety in motion including braking and limit steps.

Additional features attend to strength and to effective assembly either in a factory or in a ready to assemble package carried out by an owner.

Finally attention is directed to spatial features which reduce risk of pinch injury to hands (of either the user or wandering toddlers) when the chair is in use.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is perspective drawing of an X frame kneeling chair with fixed plates demonstrating prior art.
FIG. 2 shows a prior art kneeling chair with seat plate 1 and kneel plate 2 fixed to a continuous C frame with has down turned ends at both ends and a broad flat region contacting the floor. In a rocker version of the C frame, the floor region is molded to a rocker bottom. The paired C frames are joined both by the fixed plates of seat plate 1 and kneel plate 2 and by supplemental plates between the C frames as shown at 9. The angle of the down turned ends 8 is arithmetized in the mold to best fit for average users and the plates are fixed to the angle provided in the frame, therefore without any need for a wedge modifier as discussed in the decision task for the X frame described in FIG. 1.

FIG. 3 depicts an X frame kneeling chair with seat plate 1 tilted back to its more or less horizontal position in the manner for sitting back. Both the seat plate 1 and kneel plate 2 are joined to their respective X members 3 and 4 by a pivoting axis defined by tube members 24 and 25. Tubular member 24 and 25 are analogous in their service for rotation of either plate and may vary in size which influences the available degrees of rotation until impingement upon any frame region or any provided stops. Most of the discussion is directed to the larger tube 24 which is most visible in this drawing and in the later figures of detailed view which follow, but tube 25 is comparable in the same discussion terms.

FIG. 4 shows an angular modification of X member 3 at its top for mounting a frame extension 16 which cantilevers back to provide mounting surface for stops 11 which are provided as a pair at the backward limit of rotation for seat plate 1 (the pair can be visualized in other figures).

The forward tilt of seat plate 1 is variable through a range until reaching a forward stop 13 which is preferred to be a compressible material joined to an adjustable rod 12 having threaded relationship to a threaded region within X member 3. The threaded region is served by a press fitted threaded insert which need not be shown.

To the extent that locking of the chosen height is needed, it can be provided by a locking wheel 14 which contains a central threaded region traveling on the same threaded rod 12.

It must be noted that stops at 11 and at 13 should be provided with upper regions which are compressible compound such as rubber, molded to the remaining structure of the body of stop 11 or 13. The height of the stops 11 or 13 and the diameter of the tube member 24 is provisioned to exceed the dimension of a human adult finger as it is common for the hands to be casually dangled downward into areas at risk of pinch injury. Accordingly the risk of pinch is limited to the cushioned portion of any stop that is provided.

The kneel plate 2 is in a region less prone for pinch injury by a user who is unlikely to reach toward the feet in a casual manner. It should be noted that the X member 4 is not modified by any plate such as frame extension 10 provided under the seat plate 1. This means that the foundation surface is the plain 180 degree surface of the X member itself and the range of rotation is limited by the small offset of the axis of rotation above the X member surface. In the case of the seat plate, the greater than 180 degree angle which is achieved between the surface of frame extension 10 and x member 3 allows greater angular rotation of seat plate 1. A knee plate 2 does not require the greater range of rotation but this could be provided by analogous modification of supporting member 4 with an elevating spacer or simply increasing the diameter of tube 25.

Any stops in the kneeling region which are not mandated to prevent pinch injury may still be mandated also to prevent damage between collision of parts, which can occur specifically where edge 26 impinges on the upper surface of x member 4 and also where the under surface of kneel plate 2 impinges on the forward edge 27 of x member 4.

If it is chosen to provide the pinch protection with bumper stops mounted at these surfaces, then the diameter of tube member 25 (which is also surface mounted to the x member 4) should be increased to define an axis of rotation which exceeds the height of a stop in any direction accordingly to allow sufficient angular motion of kneel plate 2 in both directions in relation to those elevated stops.

It should be noted that the range of rotation between a paired plate and supporting member are proportional to the offset of the axis of the tubular axle and this offset can be increased either by enlarging the diameter of the tubular axle or by inserting a bulky shim between the axle and the plate or the supporting member to provide a greater degree of rotation. This description is provided to show that the diameter of
the tube serves as an offset feature that would otherwise have to be provided by other elements in the paradigm of hinges (such as offset hinges or hinges provided with interposing matrix of very thick shim plates) all of which would be mounted in a mid region of the seatplate. It must be noted that the focus of pivot on either plate 1 or 2 is in the mid region of the plate and the range of rotation is in two directions. A leaf hinge if mounted in a mid region would offer difficult methods for mounting since a leaf hinge must be mounted with its leaves relatively entirely opened and a leaf hinge is made accessible by being on the edge of its object during mounting (such as a edge of a door rather than in the door’s middle region).

Each plate is aligned to each tube member by straps which can be typical pipe straps such as are used to surface mount tubular conduit. Each plate or X member is provided a pair of straps, and as a result there are two pairs of straps per tube member which are intended to be mounted relatively far apart to provide the most torsional stability against deviation away from the axis which is defined by the tube member. The straps, such as 22 to the frame and 23 to the seat plate, are also labeled in FIGS. 4 and 5 which has a closer view.

FIG. 4 shows seatplate 1 in a wire frame outline in forward tilted position to rest on stop 13. The lock wheel is shown as accessible near the front end of a seatplate. Fixed strap 22 securing the tube member 24 to the frame extension 20 and it should be noted that motion is disallowed at this strap by a central screw through both the arc of fixed strap 22 and the tube member 24 and which is visible where the lock lever for numeral 22 contacts the fixed strap 22. This means that the fixed tube member 24 is enabled to serve as a braking surface in relation to the rotating seat to be described later. In this view the lip straps which secure the tube member 24 to allow for pivot motion are obscured under the friction blocks 28, but strap 23 is labeled at a visible edge in the view.

Pivoting of a seat in the middle range of rotation is intentionally meant to be dampened in the invention and two means are provided both of which deploy the tube member 24 as a braking surface.

Friction blocks 28 are provided on the underside of seat plate 1 which provide concavity to conform to the radius of the tube member 24 and should be a material that is semi rigid but with high friction characteristics. In FIG. 4 the friction blocks 28 obscure the straps such as 23 in FIG. 5 which retain the tube member to the seat plate. It is preferred to attach the friction blocks 28 in place with the same screws which would hold straps such as 23 best seen in FIG. 5.

As an alternative to frictional material inherent in a frictional block 28 it may be preferred to deploy the block only as an appropriate material of mounting matrix for gluing and shaping a thinner frictional layer which is semi rigid, but flexible enough to conform to the radius which is offered by the friction block. The friction blocks 28 are the locus of a value judgment which is to apply a chosen amount of resistance according to the weight bearing pressure riding upon the tubemember 24. In some cases the operative value system may be to minimize resistance and provide a smooth and least friction bearing surface. In such a case the material provided at the friction blocks would be accordingly chosen. A non weight bearing paradigm for braking is provided next.

Additional braking is provided by positive mechanism which is joined to the underside of the seatplate 1 by a guide block 20 and nut block 17. A constricting brake band 21 surrounds a portion of the tube member 24. The brake band 21 is anchored to guide block 20 at one end and the other end of the band is joined to a brake pin 18 which passes through nut block 17 and which is threaded into the housing of nut wheel 16. The pin carries a square profile 19 as it travels through the matching guide block 20 so that the pin may not rotate and must travel linearly according to threaded turning of nut wheel 16 as it impinges on the nut block 17 which retains the brake pin under the seatplate. Appropriate liner material with high friction coefficient may be interposed between the brake band 21 and the cylindrical surface of tube member 24.

FIG. 5 shows a rear view of an X frame kneeling chair with the seat plate 1 tilted forward and away from the rearward stops 11. Friction pad 28 is shown with a concave contour clamped against tube member 24 in alignment with the anchoring of slip strap 23. The friction pad presses downward by the simple force of weight bearing upon seatplate 1. The kneeling region is shown with kneel plate 2 removed to reveal the paired straps 29 and 30 anchoring tube member 25 to the kneeling plate 2 (which is removed) and to x member 4 respectively. It should be noted that the outside set of the paired straps, which anchor the plate at 29, are accessible for mounting outside of the width of x member 4. Bumper stops 31 are shown to protect x member 4 from full impingement by a mounted kneel plate and it is preferred that they be higher than the diameter of a human finger.

In this perspective depiction, further demonstration that the seat plate is not parallel to the surface of frame extension 10 is revealed by the non parallel relation of the mounting flange portions of each strap pair. It should be noted that the slip strap 23 (and its counterpart strap in the opposite pair of straps which anchor to seat plate 1) are situated along the length of the tube member 24 outside of the width of x member 3 so that mounting of the seat to the tube with the strap 23 can be easily accomplished after the tubemember 24 is previously fixed to the frame by strap 22 where it resides under the mid region of seat plate 1. This effectively overcomes the previously described problem that leaf hinges are disadvantageous to deploy in the difficult mid region between two broad surfaces in order to rotate. Even if such leaf hinges can function in conjunction with bulky shim blocks to allow a range of rotation, once applied to the first rotational part they may require provision of access holes in that first part in order to attach the leaf to the second part which is obscured by the first, or the hinge itself would require an offset along axis of the rotation which is partly outside of the width of the x member 3. Accomplishing pivot with the axle and strapping is advantageous on sequential assembly.

FIG. 6 shows modification of a C frame kneeling chair in the upper hooked inclined regions 8 of the paired and parallel frame which has been previously been shown in the prior art FIG. 2. Although the profile of a C frame kneeling chair can be made from tubular metal, in general the C frame kneeling chair is often appreciated as furniture for being molded of bent wood construction, however such continuous layered molding cannot provide the cantilevered frame extension 8 for mounting rear stops 11. Similarly the paired C frames of metal tubing are also obtained as a series of bends in a continuous length of tubing.

Two fixed plates are bridged between the rails of the C frames at the hooked region 8. Plate 32 serves as a mounting site for an anterior stop such as 13 provides in the prior figures for an X frame. The rearward bridging plate 31 is a cantilevered extension from the C frames with bracing 33 for attach
ment and analogous to the previously shown frame extension 10 of earlier FIGS. 3, 4, 5 and provides mounting sites for rear stops at 35.

[0046] An angle of greater than 180 degrees is formed with the surface of forward bridge plate 32 which provides a forward stop site 34. The tubular member for defining an axis of rotation would be placed near to the intersection of either plate for example on rear plate 31 in the long rectangular region shown as 36. The intersecting angle defined by plate 32 and 31 could be provided in a modified molded profile for the C frame so that tube 24 could be mounted on the face frames at the approximate intersect of the provided angle. It can be appreciated that the provision of bridging plates is not necessary for the mounting of a tube member with straps to provide rotation of a plate in relation to a frame region. However the provision of the rearward plate 31, analogous to frame extension 10 in the X frame figures, is the preferred extension of paired C frames for limiting backward tilting of a seat plate. Bumpers or stops to avoid impingement of a rotating plate against frame members may be applied to those regions of the frame or plate which impinge, but it is preferred to provide the bridging plates for the mounting of such stops whether the stops are of single or adjustable dimension.

[0047] Analogous extension plates could be provided for limits to knee plate rotation, though usually the lesser range of rotation of a knee plate does not require rotation to approximate horizontal orientation. The incline surface of the hook region 8 in a typical C frame is sufficient to mount a tube member 25 to serve a kneel plate. Bumper stops may be provided on such a hook region as the lesser degree of rotation provided by the elevation of the axis of rotation is acceptable. Rigidity between the frame members is also not a mandatory reason for providing either single or a pair of extension plates at the kneeling region of the C frame chair so long as sufficient rigidity is accomplished by dedicated rigidity plates such as 9 in FIG. 2 of the prior art.

[0048] It can be seen that the invention as taught has ready application to the existing frames of kneeling chairs which deploy only fixed seat and kneeling surfaces. As shown in the specification, tilting for sitting and kneeling plates of a kneeling chair are enabled to rotate in two directions around an axis of rotation which is provided in the middle region of each plate. This allows the user to seek out a locus of balance that is still central in the plate while the range of rotation varies away in two directions. In one case the tilting is forward in degrees of increasing inclination where the user eventually chooses to seek the benefit of a vector of added support support by deploying knees upon a kneeling plate. When a user does deploy one or both knees for support, the rotation of a knee plate provides variability for the differing strike angle of the pretilial below knee leg surface which varies according to the leg length of the user.

[0049] In the other case the user may tilt backward with less inclination approaching horizontal, where the human anatomy does not have any rearward appendages to counter and where rearward stops are provided. Rearward rotation may also be carried to posterior ranges of inclination, which are beyond horizontal, according to either fixed or adjustable stops mounted on an extension region. Although frame extension 10 in FIGS. 3, 4, 5 is depicted as horizontal it may be preferred to have additional rearward slope allowing such greater posterior inclination. Surfaces and hardware are provided for stops in both directions. It must be appreciated that the deployment of adjustable stops even in the rearward direc-

tion may be desirable and some users may wish to adjust the degree of rearward tilt to go beyond horizontal. The adjustable stop as provided forward is deployable both forward and rearward. The appropriate extension of frame or bridging plates are provided for mounting both rearward and forward limit stops and for mounting hardware to determine an axis of rotation in the middle region of a broad plate held relatively closely to a frame structure.

[0050] The straight line between forward and rearward limit stops defines a 180 degree virtual plane from which the axis of rotation must be elevated away to achieve any rotation. A range of rotation is achievable by any greater displacement of the axis of rotation from the virtual plane by the placement of an extension plate angled from the frame such that the axis of rotation falls further outside of the virtual plane formed by forward and rearward stops. Additionally the tilt may be tuned for greater range of rotation by providing a larger diameter axle or providing shim blocks between for the axle in relation to either the moving plate or to the frame in order to offset the axis of rotation from either of the paired parts which share an rotational reference. In the choice of the invention shim blocks are provided to offset from the seat plate to provide a component of offset and rotational range and since that shim block is deployed between the rotational part (the seat plate) rather than the fixed part (the frame) then it serves as a friction block with selected braking by coefficient of friction. The invention provides offset by frame extension anatomy, by axle diameter, and by chosen shim blocks, all of which may be varied to a goal of rotation range.

[0051] The mounting of hardware to accomplish this is convenient to manufacturing and ready to assemble users and the spatial tolerances provide ease of access for monitoring and maintenance of the hardware parts such as straps. The open spaced elements of the invention provide safety to avoid the hazards of pinch injury.

[0052] The tube members provide a number of intended advantages over simple hinges which join either plate to its respective x member 3 or 4. If leaf hinges were provided to define a rotational axis, there would undoubtedly be two needed for each plate/member site and those two hinges would also be preferred to be mounted far apart along the axis of rotation for stability. The tubular member provides a single light weight alternative to multiple hinges or to hinges which must share a solid single pad for stability such as the so called piano hinge. In the invention straps are elected which are widely spaced and which could be supplemented to be more than two for each rotating plate or frame member region chosen. Although straps are deployed and convex channels within spacer blocks are provided, other analogous mounting hardware could include stamped and press formed channels of sheet metal material equivalent to straps and spacer blocks.

[0053] The elements to enable rotation provide shimming which can be sized to accommodate varied ranges of rotation and provide a long axis of rotation stabilized at rotational anchors that are far apart and inexpensive as in the case of straps. The tube member provides the operating surface for matching to a braking material which can be self aligning during wear. Additional braking elements are provided for positive mechanical breaking which can be adjustable tension.

[0054] A tube member as an axis of rotation provides substantial rigidity between two relatively far apart points of strapping so that a tube member contributes to the stability between outlying members of a frame (as described in the
case of the C frame of paired and parallel members) especially as addition strapping pieces or cylindrical tunnels of strapping may be applied.

[0055] Discussion has conveyed how the range of rotation may mandate differing choices of diameter for the tubular axle member, but it must be noted that other mandates may apply to choice of diameter of axle, such as the mandate to have a given circumferential dimension for the application of braking and also having sufficient diameter in proportion to tubular length to provide rigidity. Additionally although the invention advocates hollow tubing such as metal which is inexpensive and very rigid, other materials might be chosen for an axle which is low density, highly rigid but solid, including polymers which may be extruded hollow or solid.

[0056] In regard to the use of a single axle to define a rotating relationship between joined parts, it must be remembered that such an axle is elected to be fixed (non rotating) to at least one of those parts in order to enable a braking of rotation between those parts. Where braking is not a concern then the axle may be retained by simple means that allow a simple floating rotation to both of the joined parts (plate and frame).

[0057] It must also be appreciated that the invention has employed a braking strap which originates and terminates entirely on one jointed parts which is a rotatable seat plate, and the seat is braked against a fixed axle which is on a frame member. Analogous braking parts could transposed entirely to mounting upon a frame member while converting the axle to a fixed relationship with a seat plate and accordingly still accomplish a braking relationship. In such a case the axle and seat plate would rotate within the retaining straps and braking band mounted on the frame. Because the axle provides a stationary virtual axis of rotation, it is even possible to split the mounting of a tensioned braking strap so that the strap originates on the frame, and contacts the axle surface to then terminate for tensioning elsewhere upon the seat plate. Such transposition or even separation of origin and termination between respective frame and plate are within the teaching of the invention even which has a preferred choice.

[0058] The brake band and associated hardware is originated on the seat plate for uniformity of function and manufactured association and for most convenient placement of the terminating portion in a tensioning nut wheel.

[0059] The principles taught can also be deployed to tiltable seat surfaces interacting with frame parts on chairs which may not present inclined frame surfaces and which are not intended for kneeling. In addition to the specifics demonstrated as preferred in the invention here, principles have been taught which are applicable to the relation of a seat surface or support surface in other items of furniture or fixture. For example an individual may employ the seat plate of the invention as tilting with a range of forward and reverse inclination on both sides of horizontal and with dampened braking features without ever choosing to use the kneeling elements, in which case the kneeler chair is functioning as a balance stool for choosing sitting postures in a range of tilt. For such a stool in production, the principles of assembly and the range of inclination defined by forward and rear stops and the offset of axis in the tube between those stops has been taught. Other materials may be deployed including a variety of joining and anchoring materials and hardware which still are derived to maintain the geometric principles applied in the embodiments. The embodiment of the invention in the specification defines principles which are further stated in the claims.

1. I claim in a kneeling chair having an inclined seat plate and a knee plate, each mounted to a respective frame member the invention comprising a tiltable seat provided as a plate, or a tiltable knee rest as a plate (or both said plates provided in the same said chair), each said plate joined to each said respective frame member in a hinged relationship to said frame member.

2. The invention in claim 1 including wherein said hinged relationship is accomplished by a reference axle to which said plate and said frame member are joined and where one or both of said plate and said frame member are enabled to rotate around said reference axle and including wherein said reference axle is tubular.

3. The invention in claim 2 wherein said reference axle is fixed in relationship only to either said frame member or to said plate (designated as the fixed pair part) and the remaining one of the two (said frame member or said plate) remains a rotatable pair part in relation to said reference axle.

4. The invention in claim 2 wherein said axle is retained around portions of its circumference within strap like anchors, said straps being fastened to said frame member and to said plate which are joined in an operating pair.

5. The invention in claim 2 wherein said plate, which may serve as a seat, is provided with a shim block, with cylindrical recess to mate with the circumference of the tubular axle at one or more points under said seat plate wherein the weight of said plate is applied through said shim block, and where said shim block may be chosen for its preferred coefficient of friction against the circumference of said reference axle.

6. The invention in claim 5 wherein said shim block provides additional clearance at said cylindrical recess providing for the insertion and fixation of a selected layer of material offering a chosen coefficient of friction operative against said axle surface.

7. The invention in claim 3 wherein said reference axle is partially surrounded within a braking strap mounted upon a region of said kneeling chair which is a rotatable pair part and said braking strap provides constriction on the circumference of said axle to restrain rotation in relation to said fixed axle mounted on said fixed pair part and said rotational pair part may be a seat plate or a knee plate or both on a given kneeling chair.

8. The invention as in claim 7 wherein said braking strap is adjustable for braking load comprising an anchoring of one end of strap and a non rotating pin joined to the other end of said strap and said pin is moveable along its length by threaded travel through a tightening nut.

9. The invention in claim 1 wherein said plate having an anterior region of impingement superimposed to its paired frame member during rotation and carries an anterior stop to limit forward rotation and pinch space distance, said stop may be applied to said plate or to its paired frame member.

10. The invention in claim 9 wherein said anterior stop is adjustable in height comprised by a rotatable rod protruding from said frame member and enabled to rise or fall according to a threaded relationship with said frame member.

11. The invention in claim 1 wherein said reference frame member so inclined and serving as support for said hinged seat plate is provided with a rearward frame extension of generally horizontal orientation positioned to limit backward tilting of said plate and said frame extension may carry 1 or more rearward stops to alter the angle of backward tilt and the rearward pinch space distance between said extension and said plate.
12. The invention in claim 11 wherein said rearward stops are adjustable as provided for in claim 10 by mounting upon a rod having threaded relationship to said frame extension.

13. The invention in claim 9 wherein said plate is provided in a region serving as a knee rest and is provided upon a frame member.

14. The invention in claim 2 wherein a range of rotational movement is provided for said plate in relation to said frame member according to offset of the virtual axis of said reference axle from either said plate or said frame member which are joined by said axle as a pair and where said offset is provided in relation to either part of the pair by a shim block interposed between said axle and said part of the pair.

15. The invention in claim 2 wherein a range of rotational movement is provided for said plate in relation to said frame member according to offset of the virtual axis of said reference axle from both said plate or said frame member which are joined by said axle as a pair and where said offset distance is provided in relation to both parts of the pair by an axle of chosen enlarged diameter interposed between said axle and said parts of the pair, including wherein said axle is tubular or otherwise constructed of a low density matrix.