United States Patent [19]

Feher

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[45] **Jan. 9, 1973**

[54] **ADJUSTABLE CHAIR**

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[52] **U.S. Cl.**.....**297/26,** 297/28
[51] **Int. Cl.**.....**A47c 4/24**
[58] **Field of Search**.....297/27, 26, 28, 24, 25, 19, 297/57, 359, 21, 55, 56, 53, 41, 46, 16, 313, 338

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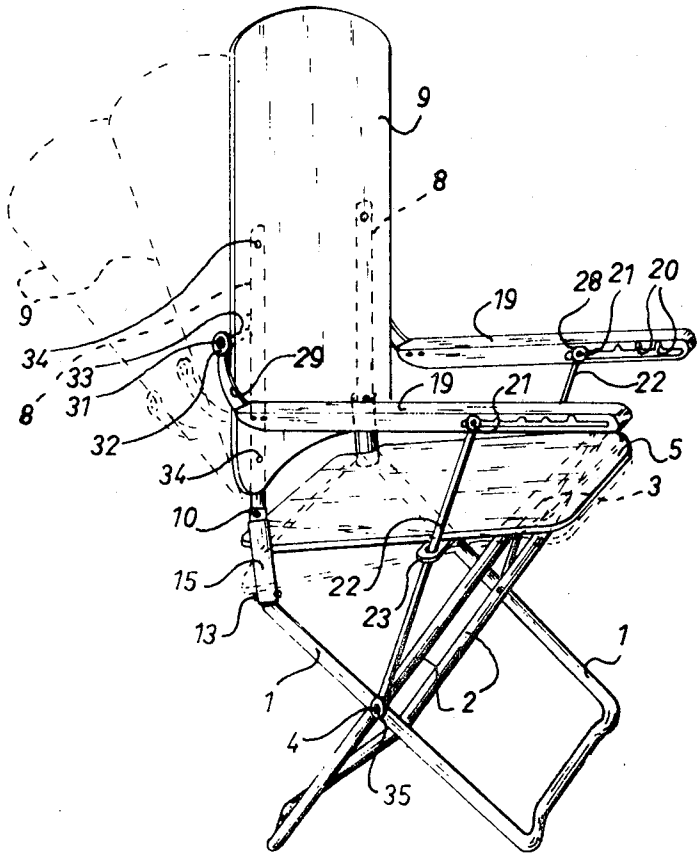
Primary Examiner—Francis K. Zugel
Attorney—Pierre Lesperance

[57] **ABSTRACT**

An article of furniture more particularly a chair of the non-folding or folding type, in which both the seat and back-rest can be adjustably inclined in a separate and independent manner to provide a great number of postures. The arm-rests, which are pivoted to the back-rest and are used to incline the same, are arranged to remain level despite change in the back-rest inclination. The article of furniture may constitute a leg holder with an adjustably inclinable leg support panel equivalent to the chair seat.

4 Claims, 16 Drawing Figures



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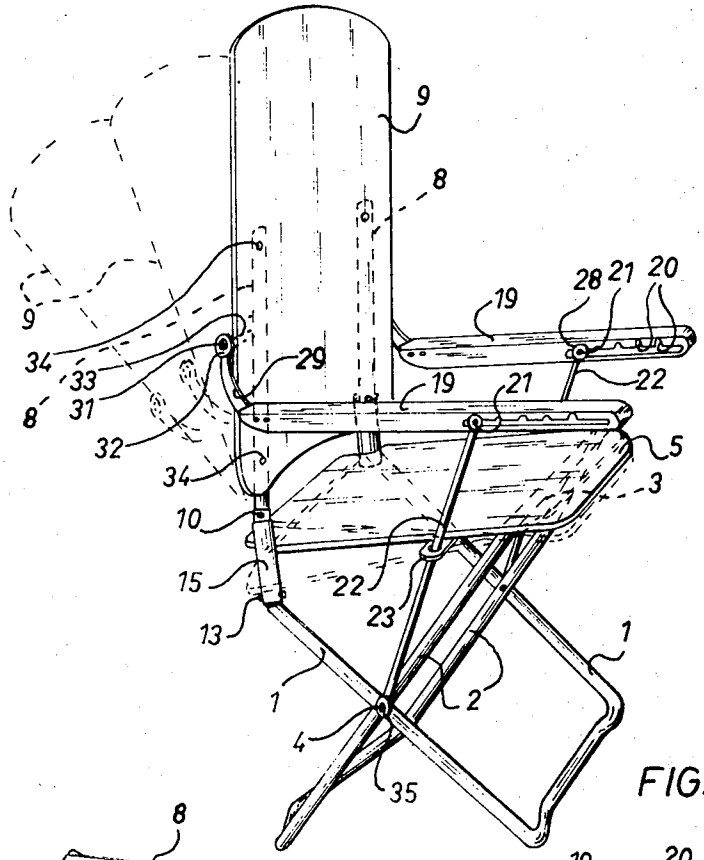

FIG.1

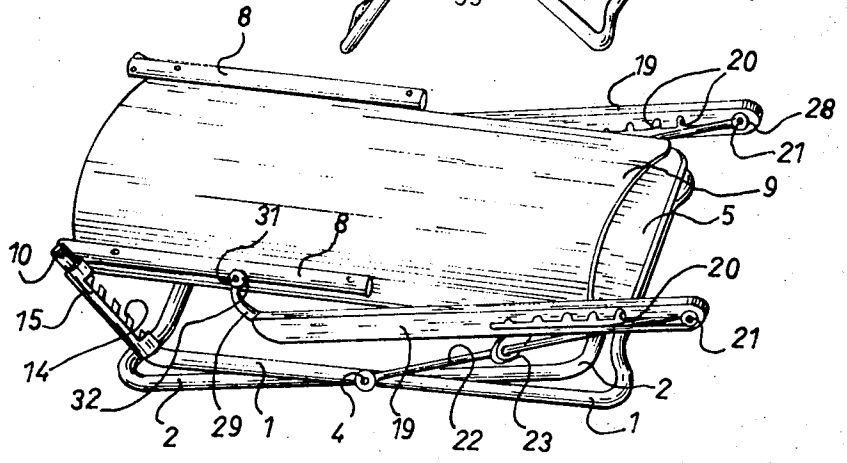

FIG.2

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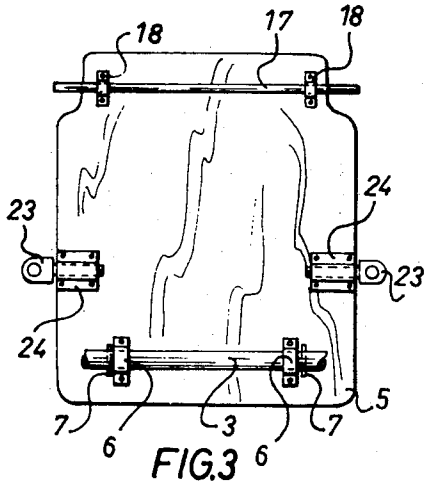

FIG.3

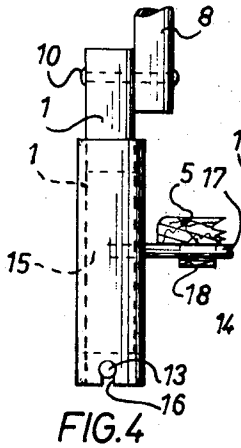

FIG.4

FIG.5

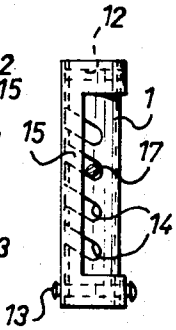

FIG.6

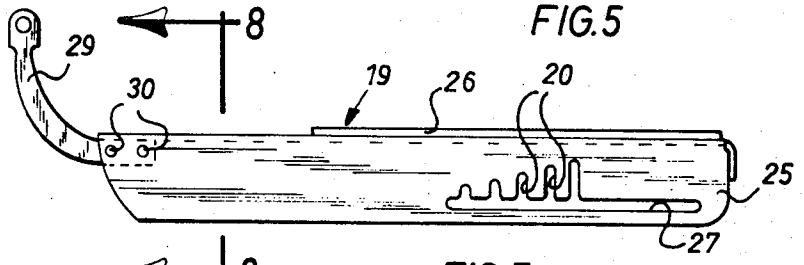

FIG.7

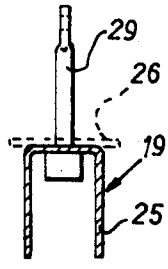

FIG.8

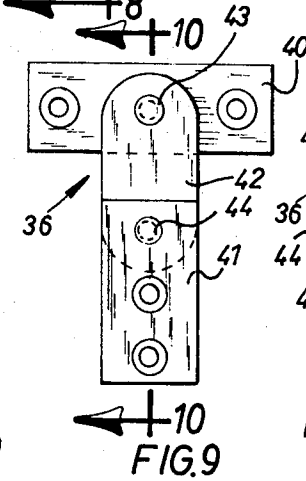

FIG.9

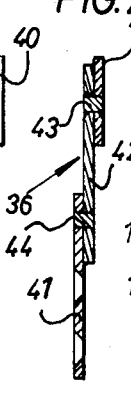

FIG.10

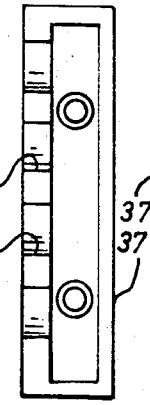

FIG.13

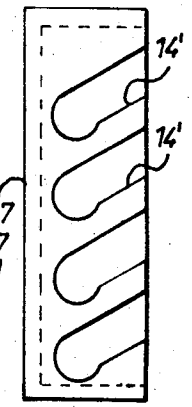

FIG.14

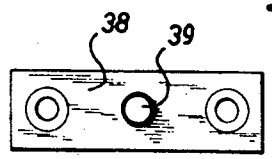

FIG.11

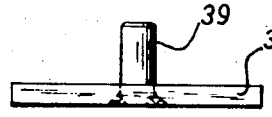

FIG.12

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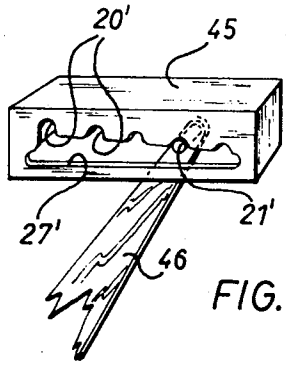

FIG. 16

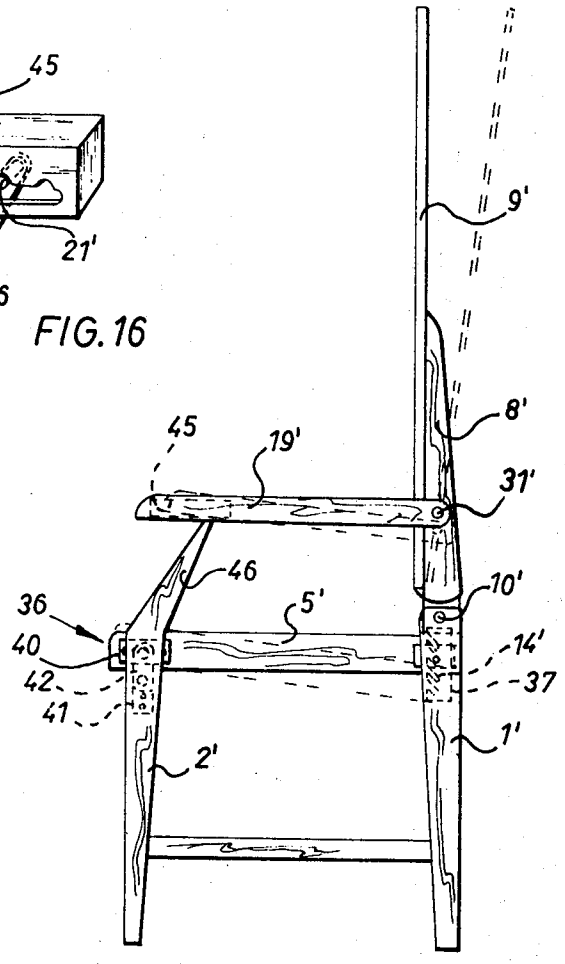

FIG. 15

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ADJUSTABLE CHAIR

This invention relates to an inexpensive adjustable chair where the position of the seat can be changed independently from the position of the back of the chair, giving as many as twenty postures altogether.

In a few offices or homes, recliners with three different positions are used, but the relation between the seat and back cannot be changed; it remains the same when these chairs are moved to any other position. These recliners are expensive and not many people can afford to possess them.

Due to the above-mentioned reasons, these chairs cannot be used for therapeutic purposes for those people who are suffering from spine troubles or rheumatic pains in their backs and who are looking for cure, relief and comfort. One of the main purposes of my idea is to produce an inexpensive chair for people suffering with spine troubles, back aches and also for simply tired people who are sitting all day long in the same position or just weary from the everyday work. By easily changing the postures in large veriety, this chair gives not only relief but also comfort and pleasure. When the seat of the chair is set in a different level and the position of the back is unchanged — or just hardly changed — the spine and the back muscles get a gentle stretch and relaxation which can be increased by setting only the back section of the seat lower and lower. The chair made of metal tube with "hard" (masonite or plywood) seat and back, can be folded, stored and carried easily anywhere in — or out of home and could be available — if manufactured — at about the price which is paid to a doctor for only one visit.

The same purpose and result are reached with non-foldable solution, when the chair has solid, fixed legs — made of wood, for example — and solidly connected to each other underneath, below the seat. These type of chairs can be used anywhere — in homes, offices, hospitals, schools, auditoriums, convention halls, cinemas, etc. — where people spend hours sitting and get tired from being in the same posture.

By the same idea and principles, embodied with slightly and upwardly curved "seat," resting-place, but without arms and back, and adjustable and separately usable leg-holder is given. It would be very advantageous to use it in homes and in hospitals too. It is executed with shorter legs than the chair and the upper section of the rear leg is extended for more high-position.

In homes the user would find more rest and comfort with this adjustable leg-holder than with the customary one which is touched only by one part of the leg — regularly just the heel. The leg gets tired soon from the strain because the whole weight of the leg is supported only by one point or section of the leg and not the whole length of the leg lying and rested, unless the seat of the chair and the surface of the conventional and non-adjustable leg-holder are in level. When the whole length of the leg is supported, real rest and comfort are obtained; this is very important in hospitals for patients, mostly after surgery and in orthopedic wards, whose legs should be kept up and supported in its whole length in a desired height and angle. In hospitals, this leg-holder can be regarded as an important piece of furniture or a device that encourages the weak and timid patients to use it during their recovery and gives

real comfort and safe feeling to them. Additionally, both in homes and in hospitals, space can be saved by using these foldable leg-holders.

Both the chair and the leg-holder, depending on the place — home, hospitals, offices, etc. — where they are used, can be executed in differently upholstered solutions too.

FIG. 1 is a perspective view of the chair in set-up position and showing various seat and back inclinations in dot-and-dash lines;

FIG. 2 is a perspective view of the chair in folded position;

FIG. 3 is a plan view of the underside of the seat;

FIG. 4 is a front view of one lateral part of the rear leg and of a portion of the back frame pivotally connected thereto;

FIGS. 5 and 6 are side views of the parts of FIG. 4 showing the unlocking and locking positions of the lock tube respectively for securing the seat at an adjusted inclination;

FIG. 7 is a side elevation of one of the chair armrests;

FIG. 8 is a cross-section on line 8—8 of FIG. 7;

FIG. 9 is an elevation of a pivot piece to connect the seat to the front legs of a non-foldable chair;

FIG. 10 is a cross-section on line 10—10 of FIG. 9;

FIG. 11 is a plan elevation of a stud plate carried by the rear portion of the seat and engageable with the part of FIGS. 13 and 14 to adjust the seat inclination in a non-foldable chair;

FIG. 12 is a side view of the stud plate;

FIG. 13 is a front elevation of the part used in conjunction with the stud plate of FIG. 11;

FIG. 14 is a side view of FIG. 13;

FIG. 15 is a side view of the non-foldable chair fitted with the parts of FIGS. 9, 11, and 13; and

FIG. 16 is a perspective view of a leg connector box used in FIG. 15.

The two legs of the chair are made of metal tube. The rear leg 1 has U-shape with upper-open-ends, bent at an angle in its top section. The other one, the front leg 2 is joined or united in its upper section 3, forming a closed rectangular frame. The floor engaging bottom portions of both legs are bent angularly to increase the rigidity of the structure and decrease the ground-engaging surface. The width of front leg 2 fits into the inside dimension of leg 1 and connected together by pivot 4. The upper part 3 of leg 2 is rotatably secured to the underside of the front section of a seat 5 by two clamps 6 and supports the front of the seat 5 (see FIG. 3). The seat can move freely around this upper part 3 of leg 2 and pins 7 extending through the tube, or the like abutments, right at the outside edge of both clamps 6, are applied to keep the seat in proper position, preventing any side movement but allowing an acceptable play. The rear leg 1 is joined to the frame 8 of the back panel 9 by a pivot 10 at both top-ends of the leg.

From the top, a piece of tube 11 is inserted into the leg 1 for reinforcement, and they are fastened together by two rivets 12 and 13 (see FIGS. 4, 5, 6). Into this double wall are made a series of notches 14 upwardly inclined towards their open end. The top of the inserted tube 11 is level with the upper end of leg 1; its other end is below the lowest notch 14. Both ends of the leg and the back frame 8 are filled with plastic plugs for pleasant finishing.

Upper rivet 12 is placed above notches 14 and sunk and riveted into the wall of leg 1, allowing free movement for a lock-tube 15 surrounding leg 1. The other rivet 13 is headed at both ends, goes through the lower part of the double walled leg section and serves as a pin to hold the lock-tube by entering slots 16 at the lower end of lock-tube 15.

The lock-tube 15 assures the secure use of this chair with confidence in a large selection of postures. On the lock-tube 15, a window is cut out lengthwise, to provide an access for the protruding ends of a cross-rod 17 to the notches 14 in the leg 1. Cross-rod 17 is firmly secured to the underside of the rear part of seat 5 by clamps 18 (see FIG. 3). On its one side, the lock-tube has this large window and the other side is solid wall. The lock-tube surrounds the upper section of the leg 1 and can be moved freely up and down and around the leg. Without putting the lock-tube in proper and safe position to lock the cross-rod 17 into one of the notches 14, the chair cannot be set up; it collapses before one could occupy it, because notches 14 are facing forwardly of the chair.

The chair can be made not only of tube but of other kinds of shape (U-shape, square, parallelogram, cross-section) with the modification of the lock-tube. Also, the diameter of the tube shape or cross-section of the material could be altered and chosen according to the quality of metal, but any such above-mentioned modification does not interfere with the essence of the invention.

When the position of the seat is wanted to be changed, the lock-tubes 15 at both upper ends of the leg 1 should be lifted, disengaged from the pin 13 and turned through a half-circle to make free both ends of the cross-rod 17, set in one of the notches 14. Turning the lock tubes 15, their windows make free access for the cross-rod 17 to the notches 14 in both ends of the leg 1. After moving the cross-rod 17 into the desired notches 14 in both ends of the leg, the lock tubes 15 are turned back (in opposite direction than before) with a half-turn and one lets it fall down by its own weight, to be engaged by its slot 16, with the rivet 13. Then the notches 14 are closed and the cross-rod 17 is locked into one of the notches 14 by the solid wall of the lock-tube and by the rivet 13, firmly and safely holding the cross-rod 17 in the selected position. When the cross-rod is placed into the second notch from the top, the seat parallels the ground. In the first notch, the front of the seat is slightly lower than the rear. The third and fourth notches keep the rear lower than the front of the seat.

When one wants to change the position of the back of the chair, first it should be released and afterwards it can be moved easily by hands, while sitting. Both arm-rests 19 of the chair shall be raised and moved forward or back according to the desired position. Thereafter, they should be lowered and pushed down, so that one of their five openings 20 will become engaged with a rivet 21, carried by the top section of a support tube 22 going downward through an eyelet tube 23 which is connected to the side edge of the seat 5 by clamps 24 underneath, as it is shown on FIG. 3.

The eyelet tubes 23, applied on both sides of the seat, can rotate freely in their clamps. This movement is necessary when folding or opening the chair. One end of the tube 23 is flattened. Into this end an eyelet is made for the support tube 22 and a straight side, a shoulder, facing towards the outside edge of the clamp 24, is formed to eliminate the inward movement of the tube in clamp 24. The other end of eyelet tube 23, facing towards the middle of the seat, has an outwardly bent section of its periphery. When the eyelet tube is in its proper place, this bent section, about a quarter of the periphery, is turned towards the ground and leans against the inside edge of the clamp 24 to prevent any outward movement of the eyelet tube. By this solution, only a rotating movement of the eyelet tube is achieved and using just a piece of pipe material, weight and cost are saved.

FIG. 7 shows one of the arm-rests 19 of the chair. The arm-rest is made of U-shaped element 25, whose open end points towards the ground and a top plate 26. Element 25 has five openings 20 and an underlying long slot 27 in both parallel walls of the element 25. Both arm-rests of the chair are provided with two large washers 28. One of the washers is outside and the other one is inside of the arm-rest. The pivot 21 freely goes into the outside washer and passes easily through the long slot 27 and through the top section of the support tube 22 as well, and its end is riveted or solidly united to the washer at the inner side of the arm. Since the washer — located outside at the head of the pivot 21 — can rotate freely thereon and the end of the pivot is united with the inside washer, and an adequate play is left between the washers on both sides of the arm-rest, a smooth movement is assured when changing the position of the back, on folding or setting up the chair.

The width of the five openings 20 in the arm are equal, but their lengths are different. The distances of the wall portions between the openings are also equal. To obtain and keep the arms in parallel position with the ground, openings 20 are of different lengths. When the back of the chair is at a 90° position, related to the floor, the opening 20, nearest to the back, has the shortest length, but high enough to hold the rivet safely and sustain the selected position. The first opening from the front is the longest, highest one, and when it is used, the back of the chair is in the lowest and farthest position from the front.

Top plate 26 is secured to the surface of the arm-rests 19, more particularly only on the front half of them; plate 26 is made of masonite or plywood (the same material as the seat and back panel) or aluminum, and is wider than element 25, as shown on FIG. 8, for better and comfortable grip. It would be even more economical and more pleasant appearing if the arm-rests — including the curved connectors 29 — were made of hard plastic or nylon, as only one piece, eliminating the rivets 30 securing connector 29 to element 25.

The curved connector 29, made of a piece of tube, of the same diameter as the support tube 22, is fastened to the back of the arm-rest by two rivets 30. This connector is bent upward, related to the surface of the arm-rest. The upper end of the connector is closed pressed, forming a flattened section. In the middle of this flattened section a hole is made for the pivot 31. By this pivot the connector and the arm-rest are connected to the tube 8, which is the frame of the back panel. The pivot 31 goes through in the tube 8 above its middle. The outer and inner side of the flattened end of the

connector 29 are provided with large washers 32 for firmness. Between the inside washer and the back-support-tube 8, a spacer 33, made of a piece of pipe, is used to keep the arm-rests 19 in cleared position from the back panel, and in proper line relating to the support tube 22. The connector 29 moves freely on the pivot 31. The back panel, which is fastened to the frame tube 8 by rivets 34, is bent in a slight curve for comfort and fits easily between the arm-rests 19 when the chair is folded. The lower end of the support tube 22 is connected to the legs outside by the same pivot 4 which holds together both legs. Also, this flattened end of the support tube is provided with large washers 35 on both sides; outside, right under the head of the pivot, and inside, before the pivot 4 enters the leg, as well. The tube 22 passing through the eyelet 23 goes into the arm-rest from below. In its top section there is a hole where the pivot 21, provided with the above-mentioned two washers 28 on its both ends, crosses and holds the arm underneath.

The non-foldable conventional chair with fixed, solidly connected legs 1' and 2' is shown in FIG. 15;it is equipped with the following extra parts as they are shown in FIGS. 9 to 14. The sides on the front of the seat 5' are connected to the front legs 2' by pivot connectors 36, working similarly to a hinge, on both sides. The notches 14' for the different levels are formed into a steel or bronze box-like member 37 which is inserted and fastened by two screws into a cavity made in the inside edges of the rear legs 1', facing the side of the seat 5'; the access to the notches 14' in the box 37 is facing towards the front legs 2'. FIGS. 11 and 12 show a plate 38 with a stud 39. These plates 38 are screwed into both sides of the back section of the seat 5', facing towards the rear legs 1'; the stud 39 is pointing towards the notches 14' of the box 37. By the stud 39, which is placed into any of the notches 14' in the box 37, the seat can be set and kept at the desired inclination or kept horizontal. The holding plate 40 of the pivot connector 36 is sunk and screwed into the side of the seat 5' and the plate 41 is fastened and also sunk into the front leg 2' by two screws. The plates 40 and 41 are pivotally interconnected and also for relative translation movement by a link plate 42 and two strong and large headed pivots 43 and 44. The stud plate 38 is also sunk and screwed into the side of the back portion of the seat.

Comparing with the folding execution, the stud 39 plays the role of the cross-rod 17; the box 37 with notches 14' corresponds to the top section and notches 14 of the leg 1, and the pivot connector 36 works similarly to the clamped upper section 3 of the leg 2.

If this type of chair is made of wood, the movement of the arm-rest and adjustment of the back is solved, as it is shown on the foldable type. A box 45 (FIG. 16) is inserted from below unto a recess made in the front portion of the arm-rest 19'; a long slot 27' and openings 20' are formed in box 45. Otherwise, the shape of the arm-rest can be the same as in the foldable chair embodiment and is pivoted at 31' to back frame 8'.

Since the legs are immobile and stable, the support tube 22, eyelet tube 23 and washers 28 of the first embodiment, are eliminated. The front leg 2' has an upper extension inserted into box 45 and provided with a pivot 21', which goes cross-wise of the arm-rest underneath; it moves easily in the slot 27' and engages any of the openings 20'. The rear leg 1' also reaches above the seat 5' and provided with pivot 10' for pivotal connection of the back frame 8' of the chair back-rest 9', as it is shown on the foldable type.

In both types of chairs, the foldable and non-foldable embodiments, and in the leg holder as well, I wanted to materialize my inventive idea and satisfy an every-day need approaching to fill that lack from the very practical aspect and with the possible inexpensive solution. When I exerted to find the lightest weight solution and use reinforcement only where it is needed, it was done not only for the low price by saving material, but chiefly for the easy use and benefit for those people who need and use it only for therapeutic purposes.

What I claim is:

1. An article of furniture comprising front and rear legs crossing one another and pivotally interconnected intermediate their ends, a support panel pivotally connected to said front legs, and movable forwardly and rearwardly of said rear legs due to the pivotal interconnection of said front and rear legs, studs laterally protruding from said panel and means on said rear legs forming a series of forwardly opening notches disposed at different levels to selectively receive said studs, said notches being upwardly inclined towards their open ends, and further including a lock tube rotatably surrounding the means on said rear legs forming a series of forwardly opening notches, said lock tube having a solid wall on one side and a window on the other side, said lock tube, when rotated to a position with said window in register with said notches, permitting a change in position of said studs in said notches, and when rotated to a position with said solid wall in register with said notches, locking the support panel in the desired height and angle.

2. An article of furniture as claimed in claim 1, wherein said support panel constitute the seat of a foldable chair and further including a back-rest for said chair pivotally connected to the rear legs, arm-rests for said chair pivotally connected to said back-rest, supporting members for said arm-rests, said arm-rests including a plurality of openings, extending from front to back of said arm-rests, adapted to selectively receive the upper ends of said supporting members, whereby said back-rest and said seat can be adjustably inclined separately and independently from each other.

3. An article of furniture as claimed in claim 2, wherein said plurality of openings are downwardly opening notches with their bottom disposed at gradually higher levels from back to front of the arm-rests, the arm-rests being kept horizontal by the different levels of the notch bottom after the position of the back-rest has been changed.

4. An article of furniture as claimed in claim 3, wherein the arm-rest supporting members are pivotally connected to the pivotal interconnection of said front and rear legs, and further including eyelet tubes pivotally mounted on said seat and slidably receiving said arm-rest supporting members for keeping the latter in correct line and permitting folding of and setting up the chair.

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