Oct. 8, 1946. T. ELLEMAN ET AL 2,409,114

ADJUSTABLE CHAIR SEAT

Filed May 18, 1944 2 Sheets-Sheet 1

Fig. 1.

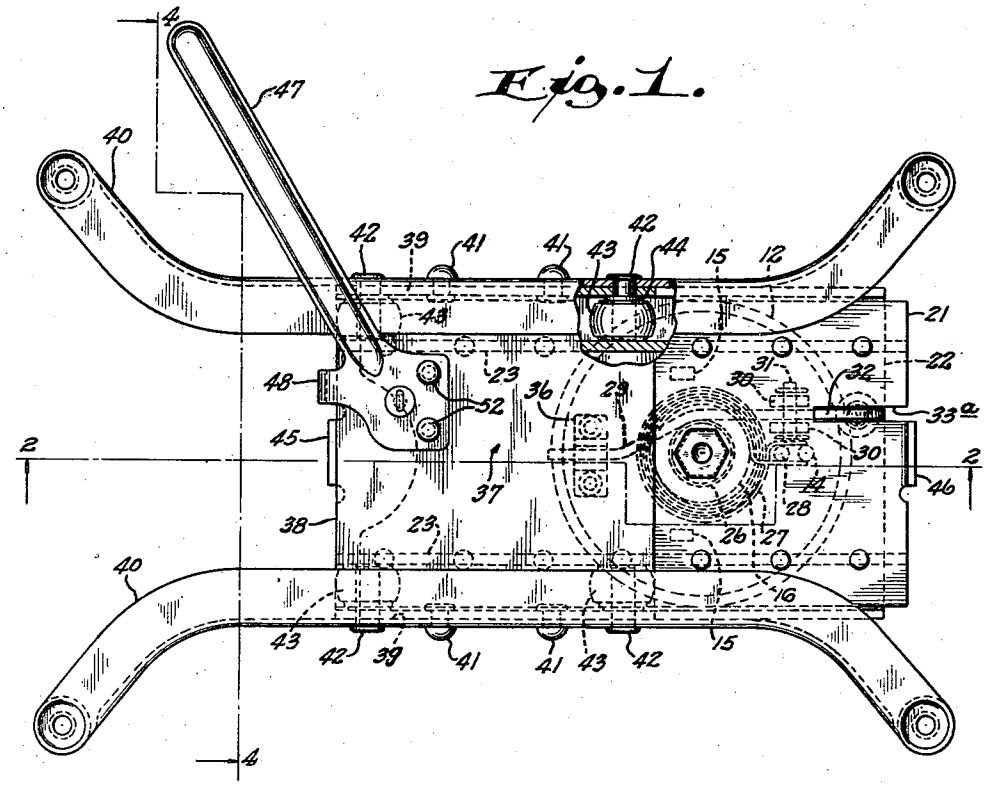
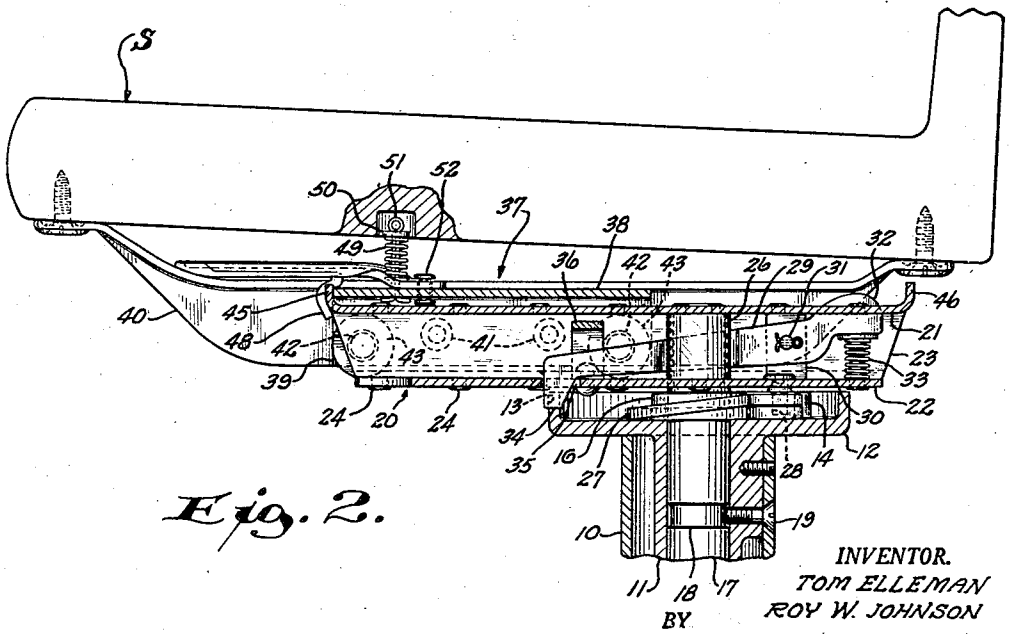


Fig. 2.



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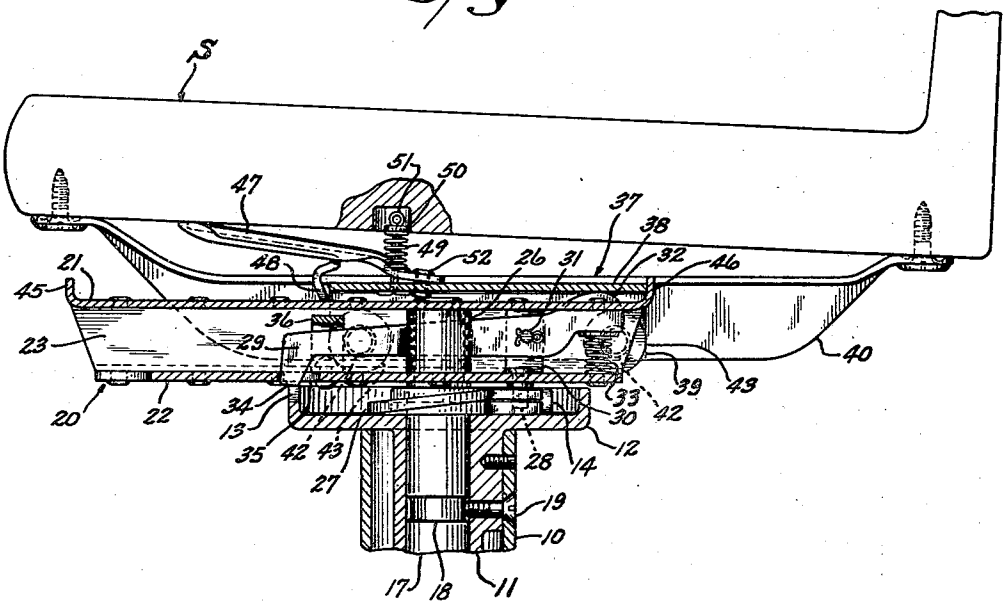
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Fig. 3.



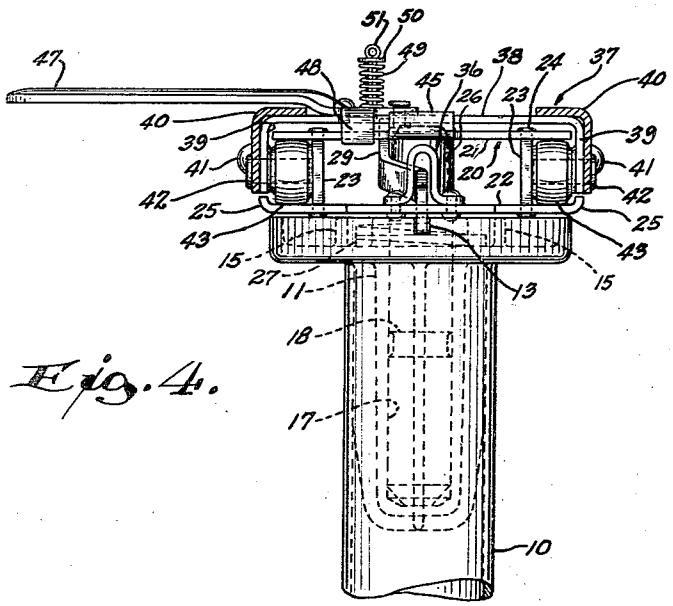


Fig. 4.

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ADJUSTABLE CHAIR SEAT

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Application May 18, 1944, Serial No. 536,092

6 Claims. (Cl. 155—95)

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This invention relates to an improvement in adjustable chair seat supports of the lockable, laterally-movable and revolving type.

An object of the invention is to provide a revolving and laterally-movable chair seat support which will automatically lock against rotation when revolved to the front position and will automatically unlock for free rotation only when the support is moved laterally to its fully retracted position.

A further object is to provide a laterally-movable seat support which will freely slide under body thrust of the occupant and not increase bearing pressures between relatively sliding parts as the seat support is moved laterally to its fully extended position.

The foregoing objects are accomplished by providing a locking lever carried by the rotatable slide support or guide box and engageable with the flange of the relatively-fixed spindle-carrying bearing to prevent relative rotation therebetween. The locking lever is spring-biased to engage with a notch in the relatively-fixed spindle bearing upon registration therewith. The locking lever is also provided with a camming surface which is engaged by the chair seat roller frame slide whenever such slide is moved to its fully retracted position. Such engagement will move the locking lever against the compressive force of its biasing spring to a position where it cannot enter the notch even though in registration therewith.

To provide for free lateral movement of the chair seat roller frame slide, the slide is provided with spaced non-metallic rollers carried in fixed relationship to each other by stud shafts secured to the slide. These rollers fit in tracks having upper and lower flanges provided on the slide support or guide box. The support is carried by a spindle which is rotatively mounted in the relatively-fixed bearing. Because the rollers are carried by the slide and are therefore always the same distance apart, the effective lever arm through which weight on the slide acts on one roller as a fulcrum with respect to the other roller does not increase as the slide is moved from its fully retracted position to its fully extended position. Thus bearing pressures do not increase as the slide is extended.

The novel features, which are considered characteristic of the invention, are set forth wtih particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment when read in connection with the accompanying drawings, in which:

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Figure 1 is a top plan view of an adjustable chair seat support embodying the present invention, a part being broken away for the sake of clarity;

Figure 2 is a view partly in side elevation and partly in vertical cross-section taken on the line 2—2 of Figure 1, the chair seat being shown in full with a section broken away therefrom for the sake of illustration, with the roller frame slide in its fully extended position;

Figure 3 is a view partly in side elevation and partly in vertical cross-section similar to the view of Figure 2 showing the roller frame slide in its fully retracted position; and

Figure 4 is a view in cross section taken on the line 4—4 of Figure 1.

Referring in greater detail to the drawings, the chair seat support comprises a base of well-known design (not shown) by which the column 10 is fixedly supported to the floor, deck or other supporting surface. The column 10 carries at its upper end a spindle-carrying bearing or hub 11. The hub 11 has a lower portion provided with radial fins or strengthening ribs by which it is securely held within the column 10. The upper end of the hub 11 is provided with a large cylindrical-shaped hollow cap 12. The edge of this cap is provided with a notch 13 which is adapted to receive and engage the dog of a locking lever for the purpose of preventing rotation of the chair support as will be hereinafter described. The upper surface of the cap has integrally positioned thereon a projecting pin 14 which acts as a centering post for a biasing spring. The upper surface is also provided with two diametrically-opposed abutments 15 to limit the rotational movement of the seat support relative to the cap. The spindle-carrying bearing 11, as is well known in the art, has a longitudinal bore for receiving and rotatively supporting a spindle. An upwardly projecting circular flange 16 encircles the perimeter of the top of this bore. The flange 16 forms a support and centering piece for the coiled biasing spring, as will be hereinafter more fully described. The hub 11 is preferably made of cast iron in order to obtain proper wearing qualities.

A vertically-positioned spindle 17 has its lower portion rotatively carried in the bore of the hub 11. The bottom end of the spindle is provided with a chamber, and it rests against the bottom of the bore in the hub 11 to carry the vertical load. The spindle may be provided with an annular groove 18 into which the end of a set screw

19 is fitted, permitting the spindle to have rotative movement relative to the hub 11 while preventing it from being withdrawn.

To the upper end of the spindle, there is fixedly positioned a slide support or guide box designated generally at 20. The guide box 20 comprises a top plate 21 and a lower plate 22. These plates are fixedly held in parallel spaced relationship by a pair of parallel side plates 23. The side plates 23 are spaced inwardly from the opposite sides of the top and bottom plates 21 and 22. The plates 23 are substantially co-extensive with the top and bottom plates 21. The top and bottom edges of the side plates 23 may be provided with projecting lugs 24 which extend through suitable aligned openings in the top and bottom plates 21 and 22 and are then riveted or swaged to securely hold the plates in fixed position. The portions of the top and bottom plates 21 and 22 extending from the outer faces of the side plates 23 to the edges thereof form the upper and lower bearing surfaces of a track for rollers. The outer face of the plates 23 also forms a lateral guide for the rollers on such track. The lower plate 22 may have the margin of its side edges turned upwardly as at 25 for the purposes of appearance and the retention of lubricant. The guide box 20 is fixedly secured to the spindle 17 to prevent relative rotative movement therebetween. To accomplish this, the upper end of the spindle 17 is provided with a reduced portion which has a press fit in a suitable aperture provided in the lower plate 22. A hollow cylindrical spacer 26 is positioned between the upper and lower plates 21 and 22 and loosely surrounds the reduced upper portion of the spindle 17. A further reduced portion on the spindle 17 is forced through a hexagonal hole provided in the top plate 21. In the assembly the upper reduced portion on the spindle 17 is riveted or mushroomed outwardly so as to fill the intricacies of the hexagonal opening to prevent the spindle from turning relative to the guide box. It will be seen that with this construction, the shoulders resulting from forming the two reduced portions on the spindle engage the under surfaces of both the top and bottom plate to equalize stress thereon. The addition of the spacer 26 also equalizes and distributes pressure on both top and bottom plates.

The guide box 20 with its spindle 17 inserted in the bearing 11 has relative rotative movement with respect thereto. It is desirable, however, to bias the guide box 20, and hence the seat which it carries, to a pre-determined forward position. To accomplish this, a biasing or return spring 27 is coiled about the flange 16 with each of its ends projecting radially on opposite sides of the projecting pin 14. When so positioned, the spring is under a slight tension. It is preferable to use about 3 coils of spring to give a sufficient amount of movement without unduly tensioning the spring. A lug 28 is riveted to the lower plate 22 and projects downwardly therefrom and in between the radially-extending ends of spring 27. As the guide box 20 is rotated relative to the bearing 11 in either direction, the projection 28 will move one or the other of the radial projecting ends of spring 27, while the other such end is held against rotation by the projecting pin 14. Thus tension is applied on the spring 27. As soon as turning force is removed from the guide box 20, the spring 27 will move it back to the original forward set-up position. In this forward set-up position, the pin 14 and lug 28 are in alignment. The guide box and the spring have a full travel of over 90° to each side of the forward set-up position. Further movement is arrested by the action of the abutments 15 which engage the radially extending end of the spring 27 to prevent further movement.

It is desirable to lock the guide box 20 against rotative movement when in the forward position, with the seat S extended, as hereinafter described, as in this position the occupant of the seat will be benefited by lack of movement. This is particularly true where the seat is being used on board vessels, club cars, or other places where the movement of the floor or deck would cause the seat to rotate to the annoyance of the user if it were not locked. To accomplish locking of the seat in this position, the guide box carries a locking lever or pivot latch 29. The latch 29 is pivotally held by a bracket 30 which comprises two members positioned on opposite sides of the locking lever 29 and extending between the top plate 21 and lower plate 22 to which they are suitably secured. A pivot pin 31 extends between these side members and through an appropriate aperture in the locking lever 29 to form the pivotal connection. The right-hand end of the locking lever 29 (as viewed in Figures 1, 2 and 3) has an upper cam surface 32. This camming surface in the normal position of the locking lever 29 extends through a slot 33*a* in the top plate 21. Below the cam surface 32 the locking lever 29 is provided with a downward projecting spring centering lug. A coil compression spring 33 is held in place by this lug and presses against the lower plate 22 where it is held in place by a similar spring centering lug fastened to the lower plate 22. Thus the locking lever 29 is urged in counter-clockwise direction, as viewed in Figures 2 and 3. The left-hand end of locking lever 29 is provided with a downwardly-projecting dog 34. The dog 34 extends through a slot 35 provided in the lower plate 22 and fits within the notch 13 formed in the cap 12 whenever the two are in register. As the notch 13 is opposite from the projecting pin 14, it is apparent that the dog 34 will automatically enter the notch 13 whenever the guide box is in the forward position. The locking member 29 is laterally offset, as shown in Figure 1, to clear the spindle 17. Hence, the bracket 30 is not on the center line of the device but to one side thereof. However, the dog 34 is substantially on the center line of the guide box. To guide the left-hand end of locking lever 29 and to cause the dog 34 to always ride in the slot 35, there is provided an inverted U-shaped bracket 36. The bracket 36 has its legs straddling the locking lever 29 and the lower portions thereof out-turned and riveted or otherwise suitably secured to the lower plate 22.

The guide box 20 slidably carries a chair seat roller frame slide assembly, designated generally at 37. The roller frame 37 comprises a top member 38 which has downwardly-depending opposite sides 39. The sides 39 straddle the edges of upper plate 21 and extend almost to the edges of the turned-up portions 25 of lower plate 22. The length of the roller frame 37 is approximately ½ the length of the guide box 20. The side arms or spiders 40 may be of any designated shape and size applicable to the size of the seat desired and are nested in overlapping position on the roller frame 37 and secured by having their side legs riveted to the depending sides 39 as indicated at 41. Each side arm 39 has a pair of headless stud shafts 42 which extend inwardly

toward and terminate just short of the side plates 23, when the roller frame 37 is in its normal position. The stub shafts 42 are provided with an intermediate flange 44 (as shown more clearly in the broken away section of Figure 1) which backs up against the inner surface of sides 39 to hold the stubs in place when their ends are riveted against the outer surfaces of sides 40. Each shaft 42 is positioned adjacent the end of the sides 39 to provide the maximum distance between them. Rollers 43 are positioned on the stub shafts 42 before the roller frame 37 is assembled to the guide box 20. The diameter of these rollers 43 is such that they roll on one and have close sliding fit with the other of either the top or lower plates 21 and 22 forming the roller track. This permits the rollers 43 to move easily in the tracks but prevents any up and down movement. The rollers 43 are provided with hubs which have a sliding fit on the outer surface of the side plates 23 and rotating fit on the flanges 44 of studs 42. Thus the rollers 43 act as spacing members for the guide box 20 and roller frame 37 to prevent lateral movement therebetween, as well as vertical movement. The rollers 43 are preferably made of non-metallic material such as plastics which have a low coefficient of friction, thus reducing wear and noise and rendering free movement.

The top plate 21 at its left-hand end (as viewed in Figures 1, 2 and 3) is provided with an abutment 45 which is turned up after the roller frame and rollers are assembled on the guide box 20. The abutment 45 engages with the forward edge of the top plate 38 to limit the movement of the roller frame 37 and determine its fully extended position, as shown in Figures 1 and 2. The right-hand end of the top plate 21 of the guide box is likewise provided with an abutment 46 which is turned up after the roller frame 37 is assembled in position. The abutment 46 engages with the right-hand end of top plate 38 to limit the movement of the roller frame 37 to the right, as is shown in Figure 3. This determines the fully retracted position of the roller frame.

With the roller frame constructed as shown, the distance between the rollers remains the same whether the frame is in its fully extended or fully retracted position, or at any intermediate position. This is important in that when any weight is placed on the seat S the effective lever arm, through which this weight acts on one roller as a fulcrum and on the other roller as an abutment, does not change as the roller frame and seat are slid from one to the other of these extreme positions. This prevents the occurrence of a binding action as the seat is slid outwardly to its extended position.

Whenever the seat is in the fully retracted position, as shown in Figure 3, the right-hand marginal end of top plate 38 of the roller frame engages the camming surface 32 of the locking lever 29 and causes that lever to move clockwise to the position shown in Figure 3, with the depending dog 34 out of engagement with the notch 13 in the cap 12. Thus whenever the seat S is slid to its fully retracted position, it may be rotated relative to the hub 11 a maximum of 90° on either side of its forward position. This permits the prospective occupant to easily place himself on the seat S. The influence of the biasing spring 27, however, will tend to return the seat S to the forward position, and as soon as it is slid a short distance from its fully retracted position, the dog 34 will be released to again engage the notch 13.

It is desirable to maintain the seat in its fully extended position, as shown in Figure 2. To obtain this result, a latching lever 47 is carried on the roller frame 37 in such a way as to be automatically engageable with the forward edge of the top plate 21 whenever the seat is moved to the fully extended position. The latching lever 47 has a downwardly-depending finger 48 which rides on the top of top plate 21 (see Figure 3), except when the roller frame is moved to its fully extended position. At this time a compression spring 49 urges the lever 47 downwardly so that the finger 48 will drop into the position shown in Figures 2 and 4 to engage the edge of top plate 21. The spring 49 acts between a washer 50 carried on the end of a through rod 51 and the lever 47. The rod 51 extends through an opening in the lever 47 and is fastened to the top plate 38 of the roller frame 37 in any suitable manner. A pair of rivets 52 loosely hold the lever 47 to the top plate 38 so that it may rock itself and then relative to the plate sufficiently to give it the movement necessary to have the latch engage and disengage with the edge of top plate 21. The lever arm 47 is made long enough to extend substantially to the side of the seat S where it may be easily engaged by the hand of the occupant of the seat to raise it from its latching engagement whenever it is desired to slide the seat S to its retracted position.

From the foregoing it is seen that whenever the seat is revolved to a forward position, the dog 34 will automatically engage with the notch 13 to prevent rotation unless the seat is at that time withdrawn to the fully retracted position shown in Figure 3. When the seat is fully retracted, it may be swung 90° to either side of its forward position. However, the occupant need not operate any latch to lock the seat in the forward position, as it will automatically lock in this position as it revolves to the front position and slides forwardly to extended position. The only control which the operator needs to manipulate is the latching lever 47. When the seat is in its fully extended position in order to slide it to its fully retracted position, it is necessary for the occupant to place his fingers under the edge of the seat S and raise the end of latch 47 upwardly to release the finger 48 from engagement with the front wall of the top plate 21. After this has been done, the seat may be slid back far enough to disengage the dog 34 and the seat swung to either side of forward position.

Although there is shown and described specific embodiments of the invention, many modifications thereof are possible. The invention is not to be restricted except insofar as is necessitated by the prior art and by the spirit of the appended claims, which are:

1. In a chair seat support, a relatively-fixed bearing, a slide support mounted for rotation with respect to said bearing, a locking lever carried by one of said relatively movable parts and engageable with the other to prevent relative movement therebetween, a seat-carrying slide carried by said slide support and laterally movable with respect thereto, and camming means between said locking lever and said slide to move said locking lever to disengaged position when said slide is in its fully retracted position.

2. In a chair seat support, a relatively-fixed bearing provided with an outwardly extending flange having a notch therein, a slide support

rotatively mounted in the said bearing, a locking lever carried by said slide support and spring biased to engage with said notch to prevent relative rotative movement between said slide support and said relatively-fixed bearing, a seat-carrying slide carried by said slide support and laterally movable with respect thereto, and camming means acting between said locking lever and said slide and operable when said slide is in its fully retracted position relative to said fixed bearing to move said locking lever against its spring bias to prevent engagement with said notch.

3. In a chair seat support, a relatively-fixed bearing, a slide support mounted for rotation with respect to said bearing, a locking lever carried by one of said relatively movable parts and engageable with the other to prevent relative movement therebetween, a seat-carrying slide carried by said slide support and laterally movable with respect thereto, camming means between said locking lever and said slide to move said locking lever to disengaged position when said slide is in its fully retracted position, and a spring biased latch operable to hold said slide in its fully extended position relative to said slide support.

4. In a chair seat support, a relatively-fixed bearing, a slide support mounted for rotation with respect to said bearing, a locking lever carried by one of said relatively movable parts and engageable with the other to prevent relative movement therebetween, a seat-carrying slide carried by said slide support and laterally movable with respect thereto, camming means between said locking lever and said slide to move said locking lever to disengaged position when said slide is in its fully retracted position, and a spring biased latch carried by said slide and engageable with the edge of said support to hold said slide in its fully extended position relative to said slide support.

5. In a chair seat support, a relatively-fixed bearing member provided with an outwardly extending flange having a notch therein, a slide

support mounted for rotation with respect to said bearing and comprising a top plate and a lower plate spaced apart by side plates extending therebetween, said side plates being spaced inwardly from the edges of said top and lower plates to form a pair of tracks, a locking lever pivotally mounted between said top and lower plates, said plates each having a slot therein, said locking lever having on one end a dog extending through one of said slots and engageable with said notch, and on the other end a camming surface extending through the other of said slots, spring means urging said locking lever in a direction which will cause said dog to enter said notch when in registration therewith, a chair seat carrying slide having a top portion and down-turned side flanges, said down-turned side flanges overlapping the edges of said top plate, a plurality of stud shafts extending inwardly from said side flanges, non-metallic rollers rotatively mounted on said shafts and riding in said tracks, one side of said rollers slidably bearing against the outer surfaces of said side plates to guide said slide relative to said support, said slide in its fully retracted position being engageable with said camming surface to move and maintain said dog out of engagement with said notch, and a latching lever carried by said slide and engageable with said support to maintain said slide in fully extended position.

6. In a chair seat support, a slide support comprising a top plate and a lower plate spaced apart by side plates extending therebetween, said side plates being spaced inwardly from the edges of said top and lower plates to form a pair of tracks, a chair seat carrying slide having a top portion and down-turned side flanges, said down-turned side flanges overlapping the edges of the top plate of said slide support, non-metallic rollers carried on the inner surface of each of said down-turned side flanges, said rollers riding in said tracks and being fixedly spaced relative to each other and to said slide top portion.

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