This invention relates to means for supporting the seat portion of a chair or the like above its base, and more particularly to a novel adjustable support means having improved and desirable features.

Various different such support means have been devised in the past, and certain of these have been made adjustable in different ways. The ideal toward which the design of all such means is directed is to provide a chair whose seat is vertically adjustable to different desired seating positions as conveniently as possible and with the minimum of effort required of the operator, and yet which is easily manufactured and which can compete favorably under very stringent marketing conditions. Previous devices have for the most part attained only the opposite extremes of this ideal, and have either provided adjusting mechanisms which were very inexpensive but which were difficult to adjust, did not afford complete adjustment in the desired increments, and were unsightly and aesthetically displeasing, or else were extremely expensive and suitable only for special installations. Consequently, the need has persisted for an adjustable supporting structure which more nearly approaches the ideal, and which will accordingly be made available to the great number of office workers and the like who particularly need chairs of this type.

The present invention has for its major objective the provision of a vertically-adjustable support means for chairs which vary closely approaches the preferred design criteria. The support means of the present invention is extremely easy and convenient to operate in either vertical direction in predetermined increments, while being for the most part concealed, and it is relatively simple and economical to manufacture, rendering it completely competitive.

The vertically-adjustable support means of the present invention may be adjusted upwardly merely by raising the seat portion of the chair to the desired height, and it will there support the weight of the chair and its occupant in a sure, dependable and positive manner. It is also a major object of the invention to provide the utmost safety and consequently the present support means automatically locks when one seats himself upon the chair, so that the adjusting mechanism cannot possibly be actuated accidentally under these conditions. Further, the present adjusting means may be either raised or lowered any desired amount by manual actuation which, as aforesaid, is extremely simple and convenient to accomplish.

The foregoing major objects and advantages of the present invention, together with other equally desirable aspects and features thereof, will become increasingly apparent upon consideration of the following specification and its appended claims, especially when taken in conjunction with the accompanying illustrative drawings setting forth a preferred embodiment of the invention.

In the drawings:

FIG. 1 is a side elevation of a typical chair incorporating the adjustable support means of the invention; FIG. 2 is an enlarged transverse sectional plan view of the structure of FIGS. 3 and 4 taken along the plane II—II of FIG. 4. FIG. 3 is an enlarged, fragmentary side elevation of a portion of the chair of FIG. 1, showing in detail certain features of the adjusting means and; FIG. 4 is an enlarged, fragmentary central section of the structure shown in FIG. 3 as seen from the side thereof.

Briefly stated, the adjustable support means of the present invention comprises in its most preferred embodiment an upright tubular support member secured to the legs or base portion of the chair, an angularly cylindrical support port column secured to the seat portion of the chair and slidable within the stationary tubular member, a series of relieved areas or notches formed in the cylindrical column, and a locking finger which projects transversely through the side of the tubular member to enter various ones of the notches which are placed in register with the finger by vertical adjustment of the column within the tube. The relieved areas or notches and the end of the locking finger are formed in a somewhat ratchet-like configuration which allows the column to be slid upwardly without releasing or withdrawing the locking finger, while simultaneously positively preventing any downward slippage of the column. Further, means are provided for constantly biasing the locking finger into place against the notches, which bias may be readily overcome by the simple manual movement of a handle structure which acts to withdraw the locking finger so that any desired upward or downward adjustment may be made. Also, and of great importance, a novel interlock is provided by which the weight of a person sitting upon the seat of the chair causes the locking finger to itself be securely locked into an engaged position with a particular notch, thereby absolutely preventing any accidental or inadvertent release of the finger which would allow the person seated to suddenly drop from a selected height of the seat to the lowestmost position thereof.

Referring now in more detail to the drawings, a typical chair 10 is seen in FIG. 1. The chair has the usual seat portion 15 and base portion 14, including a number of legs such as for example those designated 16, 18, 20, and 22 (see also FIG. 2). The vertically adjustable support means of the present invention is incorporated into the chair 10, and is depicted generally at 24, near the top extremity of the base portion 14.

Further details of the chair 10 and of the adjustable support means 24 are shown in FIG. 2. It is here seen that the support for the seat portion 12 of FIG. 1 is provided by a generally cylindrical central column 26, which is slidably fitted within a tubular support member 28 secured to the base portion 14 in any desired conventional manner. The legs 16, 18, 20 and 22 of the chair are typically spaced somewhat apart, as shown, and secured at their tops by a connecting collar 30. The legs are secured at their bottoms by a connecting harness plate 32 (FIGS. 1 and 2), and the tubular support member 28 may be rigidly secured to the collar 30 and plate 32, if desired. Vertical adjustment of the seat 12 is accomplished by sliding the column 26 up or down within and relative to the fixed tubular member 28.

Portions of the adjusting means 24 are seen in FIG. 2, including a mounting bracket 34 rigidly secured to legs 16 and 18, as by welding, and a handle 36 pivotally mounted at 38 to the bracket 34. Also shown in this figure are the locking finger 40 which the handle controls, and a cam stop means 42, which is attached to the underside of the finger 40 for limiting its travel, as will subsequently be explained further. Also, it is desirable to prevent rotation of the column 26 relative to its enclosing tubular member 28, and consequently a longitudinally keyway 44 is formed in the column 26 generally opposite the support means 24, and an indexing screw 46 is threaded through the wall of the tubular member 28 into the keyway.
The details shown in FIG. 2 are shown from another perspective in FIG. 3. Here the mounting bracket 34 is seen in posterior view, and the handle 36 is shown pivotally mounted upon the bracket 34. This mount is here seen to preferably be a rivet 38 or its equivalent, and it will be noted that a spring means 48 is entrained about the rivet, with one of its ends bearing against the mounting bracket and the other bearing against the handle 36. The spring 48 thus serves to silently bias that portion of the handle positioned above its pivotal mount 48 inwardly, toward the mounting bracket 34. The locking finger 40 is also shown in this figure, and its preferred cross section is seen to be rectangular, generally square, with a flat upper edge. Further, it will be noted in this figure that the upper extremity of handle 36 is attached to the locking finger 40, in a pivotal manner, as by the rivet means 50.

Added details of the chair and adjustable support means are shown in FIG. 4. Here the portion of the column 26 which faces the adjustable support means 24 is clearly shown to include a series of vertically-aligned recessed notches 52. Each of these notches preferably is formed to have a substantially flat, horizontal, transverse upper edge 54, and an inclined, ramp-like edge 56 which angles toward the horizontal edge 54 to form the notch. The locking finger 40 engages generally horizontally through the wall of the tubular member 28, and engages whichever notch 52 happens to be directly in register therewith, as is shown in this figure. The inward end of the finger 40 preferably matches the configuration of the notches, with the flat upper extremity of the finger abutting against the flat edge 52 of the notch, with a bevelled portion at the end of the finger abutting against the ramp edge 56 of the notch.

The mounting bracket 34 partially described previously is here shown to be generally U-shaped in cross section (see also FIG. 2), with one leg of the U being secured to the outer surface of the tubular member 28 so that the other leg stands free, away from the tube. It is to an extension 39 from the latter leg that the handle 36 is pivotally attached by a rivet 38. The manner in which the spring 40 or other like biasing means attaches between the handle and the mounting bracket 34 is clearly shown here. Like the wall of the tubular member 28, the U-shaped mounting bracket 34 also has an aperture, designated 58, through which the locking finger passes to contact the notches 52 in the cylindrical support 26. Also, the outer leg of the mounting bracket has an aperture 60 formed therein, through which the locking finger 40 can enter the end of the latter closest to handle 36.

The manner in which the handle and the locking finger are connected is best seen in FIG. 4. The locking finger has a transverse aperture 41 (FIG. 3) threethrough which rivet 50 passes and a vertical slot 57 formed in its outer end. The upper end of the handle 36 includes a vertically-oriented slot 63 having rounded ends and having a length which is approximately twice the diameter of the rivet 50. The upper end of the handle 36 is positioned within the slot 57 in the locking finger, and the aperture 41 in the finger is aligned with the slot 63 in the handle. Rivet 50 passes through both the locking finger and the handle, and secures both in this position. Consequently, when the handle is pivoted about its mount 38, its upper end moves in an arcuate path about the rivet 38 as a center, and this serves to move the locking finger to the left, out of and away from the notch. Since the locking finger is supported vertically by apertures 58 and 60, it can only move horizontally. Consequently, the slot 63 in the handle moves relative to rivet 50 and the slotted end of the locking finger in order to compensate for the combination of the arcuate handle motion and the linear locking finger motion. That is, as the handle 36 pivots counterclockwise about rivet 38, rivet 50 rides upward within handle slot 63.

It will be noted that the locking finger 40 has a slot 62 (FIG. 4) formed transversely across its top surface. When the locking finger 40 is fully engaged with one of the notches 52 in the column 26, in the manner shown in FIG. 4, slot 62 in the finger is aligned directly beneath the upper edge of aperture 60 of mounting bracket 34. When the chair has been adjusted to a desired height and the operator seats himself thereupon, his weight is transferred through vertical column 26 to the inner end of the locking finger 40, thereby in effect locking column 26 to its tubular support 28. The slot 62 in the locking finger provides clearance by which the finger may pivot slightly within aperture 58, so that the inner end of the finger moves downward and upward. The slot 63 in the handle 36 provides for the upward travel to the outer end of the locking finger, and consequently, the slot 63 will be seen to actually serve a dual purpose. In its pivoted position, the locking finger 40 interlocks its slot 62 with the upper edge of the aperture 58 of the mounting bracket, and this interlock prevents any horizontal movement of the locking finger. Therefore, the complete adjusting mechanism 24 is positively prevented from accidentally being released when a person is seated in the chair, since the inner end of the locking finger cannot possibly be withdrawn from the particular notch 52 in the vertical column 26 with which it is engaged.

A final feature of the present support means is the camstop means 42 noted previously in connection with FIG. 2. This cam stop is shown in further detail in FIG. 4, and is seen to comprise an elliptical cam element 64 which is retained in place on the underside of the locking finger 40 by a suitable machine screw 66. When the elliptical cam element 64 is in the position shown in FIGS. 2 and 4, it acts to limit the inward and outward horizontal movement of the locking finger by coming into contact with the opposite legs of the U-shaped mounting bracket 34. Consequently, the locking finger 40 cannot be positively withdrawn from the mounting bracket, either deliberately or unintentionally, unless the cam is repositioned. This is accomplished by loosening the screw 66 slightly and rotating the cam element 64 ninety degrees in either direction. This provides enough additional clearance so that the locking finger may be completely withdrawn from aperture 60; otherwise, the finger is positively prevented from being moved out of alignment with the sequence of notches in the column 26.

Having now fully and completely described the structure of the present adjustable supporting means, as well as certain cooperative functions of the height adjustment mechanism 24 in which it is assembled, and in which it operates should be obvious. When a person is seated in the chair, the tilting or pivoting of the locking finger positively interlocks this member with the mounting bracket 34, so that the inner end of the finger cannot possibly be removed from the particular notch 52 with which it is engaged to lock the column 26 to the tubular support 28.

If it is desired to adjust the vertical position of the chair, however, this is very readily and conveniently accomplished. If an upward adjustment is desired, all that need be done is to grasp the seat portion 15 of the chair and raise it. This raises column 26 within the tubular member 28 and causes the ramp-like edge 56 of each notch 52 to act as a cam surface against the inward end of the locking finger to move the finger outwardly against the bias which the spring member 48 exerts against the handle 36 and the locking finger. The column 26 thus moves upwardly until the next notch 52 in the sequence thereof comes into register with the locking finger, at which time the finger is free to snap inward into the notch. If this height is the one desired, the locking finger 40 and the locking finger will once again interlock with mounting bracket 34 when the operator seats himself. If a different height is desired, the column 26 is simply raised a further amount, until finally the desired height is
achieved, each notch 52 acting to move the locking finger 40 in the manner just described.

On the other hand, if a downward adjustment is desired, all that need be done is to press the handle 36 inward in a smooth and easy gesture. This withdraws the locking finger from the notch 52 which it then engages and allows the column 26 to be slid downwardly within tubular member 28 until the desired height is reached. When this occurs, the handle 36 may simply be released, and spring 40 will return it to its normal position while simultaneously moving locking finger 40 into engagement with the appropriate notch 52.

From the foregoing specification, it will be obvious that the present adjustable support means provides the complete ease and convenience of operation that is desired of such a device, while also providing an extremely sturdy and durable vertical supporting structure which includes a safety interlock feature for preventing inadvertent actuation of the device while it is sustaining a load. Further, it will clear that the complexity of the device is kept at a minimum, and that it can be economically manufactured and will remain essentially trouble free in operation while requiring practically no maintenance to insure continuing satisfactory operation.

While the most preferred embodiment of the invention has been shown throughout this specification, various modifications and alterations in structural details may occur to those skilled in the art after having considered this specification, which nonetheless are based upon and incorporate the spirit of the invention. Consequently, all such modifications and variations are to be considered a part of the invention, unless the claims appended below by their language expressly state otherwise.

We claim:

1. In a vertically adjustable support mechanism for chairs and the like, of the type having a base portion, an elongated support column which interfits with and is vertically movable with respect to said base portion, and means for holding said column with respect to said base portion to prevent relative movement therebetween at selected adjusted positions of the column, the improvement comprising: means responsive to downward pressure upon said column to positively interlock the same with said base portion, such that downward vertical movement of the column under such pressure resulting from improper operation or malfunction of said column-holding means is prevented; said improvement means including a pivotable member having a peripheral part engageable with areas of said column along the length thereof, such that said part is moved at least slightly downwardly by any corresponding movement of said column in response to said pressure, to thereby pivot said member accordingly; said member having an interlock portion spaced from said peripheral part and arranged to be swung toward and to engage portions of said base when the member is so pivoted; said member when engaging said column and said base portions securely interlocking the column with respect to the base to prevent downward relative motion therebetween.

2. The improvement recited in claim 1, wherein said member is pivotally mounted on said base portion.

3. The improvement recited in claim 2, wherein said interlock portion of said member engages said portions of said base by a recess formed in one thereof which interfits with a projection formed on the other thereof.

4. The improvement recited in claim 3, wherein said peripheral part of said member comprises a tongue-like protrusion and said areas along the length of said column are notches of a size to receive at least a part of said protrusion.

5. The improvement recited in claim 1, wherein said vertically adjustable support mechanism is of the ratchet type in which said column is vertically notched and said means for holding the column at selected adjusted positions includes a pawl-like locking finger for engaging such notches together with operator means for moving such locking finger into and out of engagement with such notches, and wherein said improvement means pivotable member comprises said locking finger.

6. The improvement recited in claim 5, wherein said member is pivotally mounted on said base portion.

7. The improvement recited in claim 6, wherein said interlock portion of said member engages said portions of said base by a recess formed in one thereof which interfits with a projection formed on the other thereof.

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