SELF-RETURNING CHAIR CONTROL

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3 Claims. (Cl. 248—417)

This invention relates to a chair control for swivelling a chair seat relative to its supporting pedestal, and more particularly, to a swivel control that automatically returns the unoccupied chair seat to a given swivel alignment relative to the pedestal.

A swivel chair consists of a pedestal to which the chair seat is swivelled by means of a swivel control. It frequently is desirable to return-swivel the unoccupied chair to a given angular alignment relative to the pedestal.

Thus in a schoolroom, for example, it is desirable to have all unoccupied chairs face in a uniform direction, typically toward the front of the class. This provides a more orderly appearance and further eases the maintenance of the premise. Although present self-returning swivel controls are expensive and complicated in structure, since they are generally sensitive to abuse and some further can swivel the chair seat only a partial revolution about the pedestal, they are inadequate.

Accordingly, an object of the invention is to provide an improved control for swivelling the chair seat relative to the supporting pedestal, and further for automatically returning the unoccupied chair seat to a predetermined angular alignment relative to the pedestal.

Another object of this invention is to provide a self-returning swivel control which permits full unlimited rotation of the chair relative to the pedestal, and which is simple in construction, economical in cost, and durable in operation.

In order that these and other objects may be more fully appreciated, reference is herein made to the accompanying drawing, in which:

FIG. 1 is a side elevational view of a typical swivel chair in which a preferred embodiment of the subject invention is incorporated;

FIG. 2 is an enlarged view of the chair control as seen generally in section from line 2—2 of FIG. 1; and

FIG. 3 is a development of the lower portion of the control as seen in FIG. 2, showing specifically possible interactions between the cam surface and the roll.

Referring now to the drawing, FIG. 1 shows a typical swivel chair 10 having a chair seat 12 and a chair back 14 held together in an appropriate manner and supported to swivel on a pedestal 16 bolted to the floor 18. In many applications, a chair iron 20 supports the chair back 14 and chair seat 12 relative to the pedestal 16, and depending on the design, can do so rigidly or so either or both tilt relative to the pedestal. The chair iron 20 is supported by means forming the subject matter of this invention to the pedestal 16 to swivel with its supported chair seat and back relative to the pedestal, and typically relative to a fixed location such as a corner top 22 adjacent the chair 10.

Although this disclosure shows a chair pedestal that is bolted to the floor, the control can be used in wider applications. For example, domestic use swivel chairs are supported on platforms or pedestals that rest with or without roller casters on the floor, and which upon one exerting a sufficient lateral force can be moved along the floor. Accordingly, any general reference in the specification to a chair pedestal does not limit the disclosure to the pedestal shown.

Referring now specifically to FIG. 2, the working components of the subject invention will be described. The chair iron 20 has a hub 28 having secured thereto a chair post 30 projecting away from the chair iron and extending within bore 32 of the pedestal 16. The post 30 is keyed against rotation to the hub 28, such as by knurling the end 34, press-fitting the knurled end 34 into bore 36 of the hub, and locking with drive pin 38, so that the post 30 rotates with the chair seat 12 when the latter swivels about the pedestal 16. A hub member 40 fixed within the bore 32 of the pedestal has a bore 42 which freely and rotatably receives the lower end of the post 30 to support the post laterally of the pedestal 16.

The hub 40 has a radial flange 44 which abuts the pedestal 16 to limit hub movement relative to the pedestal toward the floor 18. A smaller cylindrical portion 46 projects in the opposite direction from the flange 44 and has thereon surface 48. An umbrella shaped member 50 having a bore 52 is freely positioned on the post 30 between the hub 40 and the chair iron 20. The member 50 has a radial flange 54 and a reduced cylindrical portion 56 projecting therefrom and terminating on surface 58. The surfaces 48 and 58 abut and complement one another when the hub 40 and member 50 are stacked solid to support the weight of the chair seat and its occupant. A bearing retainer ring 60 is confined against shoulder 62 of the post and is fixed to the chair iron 20. Antifriction needle bearings 64 positioned between the flange 54 and the retainer ring 60 provide for free swivel action of the chair seat relative to the pedestal. Thus member 50 acts as a thrust member to support the full weight of the chair and its occupant and as a bearing member in the swivel assembly to permit swivelling of the chair on the pedestal.

A helical coil compression spring 70 is positioned annularly of the post between the flanges 44 and 54 of the hub 40 and member 50, respectively. The compression spring 70 tends to bias the member 50, and thus the integral post assembly including the post 30 and the chair iron 20 upwardly away from the fixed hub 40 and pedestal 16. To maintain the post assembly connected to the hub 40 with the spring under an initial compression, a transverse stop 72 extends from the lower end of the post 30 and abuts transverse lower surface 74 on the hub 40. In this regard the transverse surface 74 is inclined at an angle relative to the longitudinal axis of the post 30 to form in effect a cam surface. The stop 72 includes a roll 76 supported rotatably on transverse pin member 78, which in turn is fixed to the post 30 within a cross bore thereof. The roll 76 is adapted to roll freely on the cam surface 74 on the lower end of the hub 40.

The cam surface 74 is symmetrical so as to form dead-center positions 80 and 82 (FIG. 3) approximately 180° out of phase and interconnected by the intermediate contours 83. The spring 70 has sufficient initial compression to force the unoccupied chair seat and post assembly upwardly until retained by the roll 76 engaging the cam surface 74 (as shown in FIGS. 2 and 3). The force of the roll 76 against the cam surface 74 causes the roll to seek the stable position relative to the cam (shown at 84 in FIG. 3), thus rotating the rotatable post 30 and chair iron 20 relative to the fixed hub 40 and pedestal 16. The particular angle of rotation of the stop 72 relative to the chair iron 20, and the stable cam position 84 relative to the pedestal 16 determine in combination the stable position of the chair relative to the pedestal 16.

The weight of a normal occupant of the chair compresses the spring 70 until the surfaces 48 and 58 of the hub and thrust member engage. The total rise of the cam (between positions 84 and 86 in FIG. 3) should be slightly less than the spacing between the surfaces 48 and 58 when the post assembly is in the stable non-swivel position with the roll at position 84. This is desired so that in the chair loaded position where the
surfaces 48 and 58 abut, the roll 76 is completely separated from the cam surface 74. The occupant is then free to swivel the chair 10 entirely through repeated full revolutions relative to the pedestal 16 without any interaction between the roll 76 and the cam surface 74. However, upon the occupant leaving the chair the spring 78 then lifts the post assembly to engage the roll 76 against the cam surface 83 and to rotate the post assembly to its stable nonswivel position. It should be noted that even the unoccupied chair can be swivelled merely by manually rotating it with a force sufficient to overcome the holding force of the cam and roll. Generally since the chair seat affords tremendous torsional leverage for twisting the post and since the cam rise is gradual per degree rotation of the post, only a small actual force is required compared to the force of the spring 70. In this regard, the spring should have sufficient expansive force to lift the chair post assembly including the chair seat and chair back, as required, to the stable nonswivel position, but yet be compressible by the added weight of the chair occupant. It has been observed that for a chair as shown, a spring having a force of approximately 100# when fully compressed is sufficient.

For dependability of construction and operation, the hub 40, member 50, and roll 76 are preferably fabricated of a plastic material such as Celcon or Delrin, while the remainder of the control is of conventional structural metal. The plastic to metal combination causes little friction drag between adjacent moving parts. Further, the hub 40 has a plurality of axial ribs 88 between the cam surface 74 and the flange 44 that defines a peripheral dimension slightly larger than the bore 32. By tapering the ribs 88 slightly as at 90 to ease initial positioning into the bore 32 of the oversized ribs, the hub can be pressed with a minimum of force to a tight and virtually permanent friction fit with the pedestal. Also, overlapping concenetric cups 92 and 94 are positioned over the spring 70 between, respectively, the hub 40 and pedestal 16, and the ring member 60 and chair iron 20. The overlapping side walls prevent direct exposure of the spring 70 post 30, or bearing assembly etc. from the exterior of the control to both improve its appearance and to provide greater safety in use.

While only a single embodiment has been disclosed, it is apparent that many modifcations can be made therefrom without departing from the inventive concept of this disclosure. Accordingly, it is desired that the invention be limited only by the scope of the following claims.

What is claimed is:

1. A swivel control for supporting a chair having a chair post relative to a pedestal, comprising plastic hub means having a cam surface formed on one end wall and longitudinal ribs of uniform diameter formed on the peripheral wall of said hub means and fixed within an opening in said pedestal, said hub means having a through-bore of generally uniform dimension for receiving therein the lower end of the chair post for free axial and rotatable movements, a freely rotatable plastic collar slidably positioned on the chair post between the hub means and the chair and having a peripheral flange, a spring positioned between the hub means and the flange operable to bias said collar and hub means axially apart, a retainer ring secured to said post, a bearing interposed between said flange and said ring for rotatably carrying said ring and post on said flange whereby said bias is transmitted to said post, while permitting said post to rotate relative said collar without transmitting a turning torque to said spring, a cam follower pin projecting in a direction transverse to the axis of said post and having a roller fixed against movement transverse to said post axis for preventing engagement between said roller and the wall of said pedestal opening and adapted to cooperate with the cam surface on said hub means in response to the transmission of said spring bias against said bearing for rotating said post to a predetermined position.

2. A swivel control for supporting a chair relative to a supporting pedestal, comprising a post adapted to be secured to the chair and to project in a direction transverse thereto, a hub adapted to be secured to the pedestal, said hub having a through-bore therein operable to receive the lower end of the post for free axial and rotatable motions, a freely movable elongate integral thrust and bearing member disposed annularly of the post between the hub and the chair, said thrust and bearing member abutting the hub operable to transmit the weight of the chair and its occupant to the pedestal, anfriction means carried by said thrust and bearing member operable to permit free swivelling of the chair relative to the pedestal, a spring positioned between the thrust and bearing member and the hub adapted to bias the former in a direction tending to separate it from the latter, transverse surfaces on the hub inclined at an angle relative to the longitudinal center axis of the post, a transverse stop fixedly secured to the post and carrying a rotatable roller for rolling movement on the transverse surface of said hub along a single line from an unstable position to a stable position without engaging said pedestal in response to the bias transmitted by said spring, and said thrust and bearing member and hub being movable toward one another from the stable position an axial distance greater than that between the stable and unstable positions so as to permit free swivelling of the chair relative to the pedal when the thrust and bearing member and hub abut.

3. An arrangement for rotatably supporting a chair on a hollow pedestal of the type adapted to receive a post depending from said chair with said post carrying a cam follower at one end, the improvement comprising an annular thrust collar positioned about said post adjacent said chair, a spring encircling said post and adapted to engage against said thrust collar and an elongate integrally mounted unit hub rotatably journaled said post and having integral means formed thereon for both solely fixing said hub in said hollow pedestal and for providing a cam surface cooperating with said cam follower to return said chair to a predetermined angular position with respect to said pedestal in response to the force exerted by said spring against said collar and chair while preventing the separation of said post and chair from said hub.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,223,376
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It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 44, for "unit" read -- unitary --.

Signed and sealed this 24th day of January 1967.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents