

Nov. 15, 1938.

J. MERIVAARA

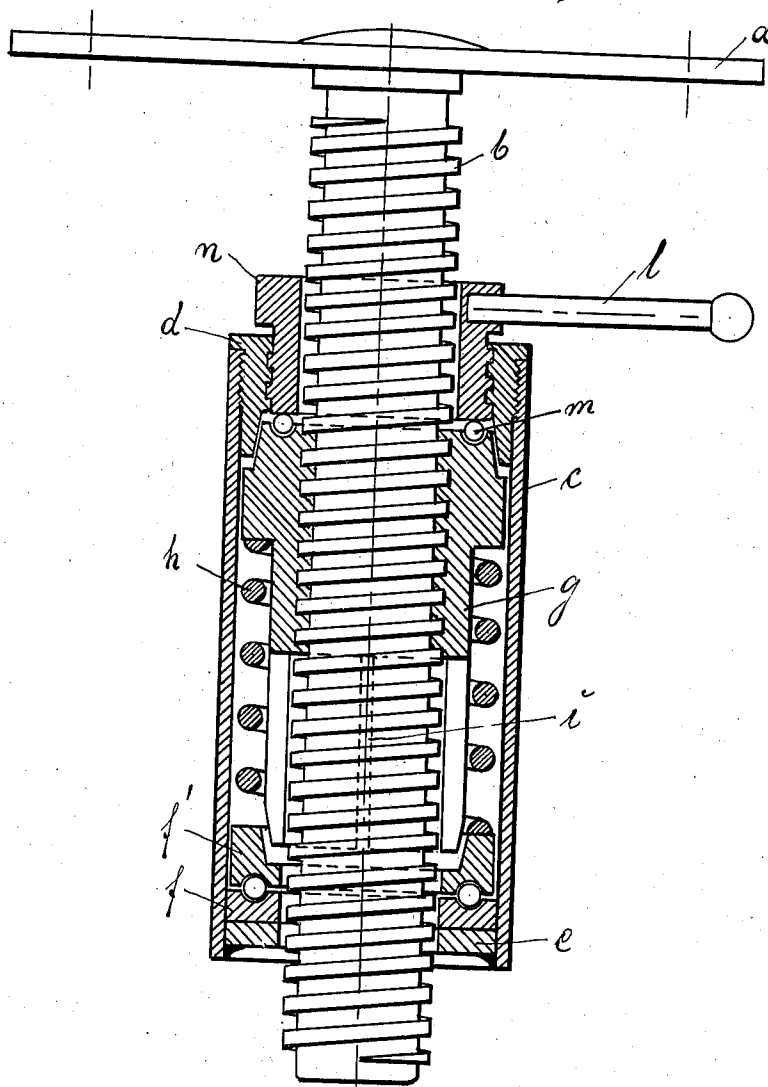
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AUTOMATIC SCREW ARRANGEMENT FOR REVOLVING CHAIRS AND THE LIKE

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2 Sheets-Sheet 1

Fig. 1.



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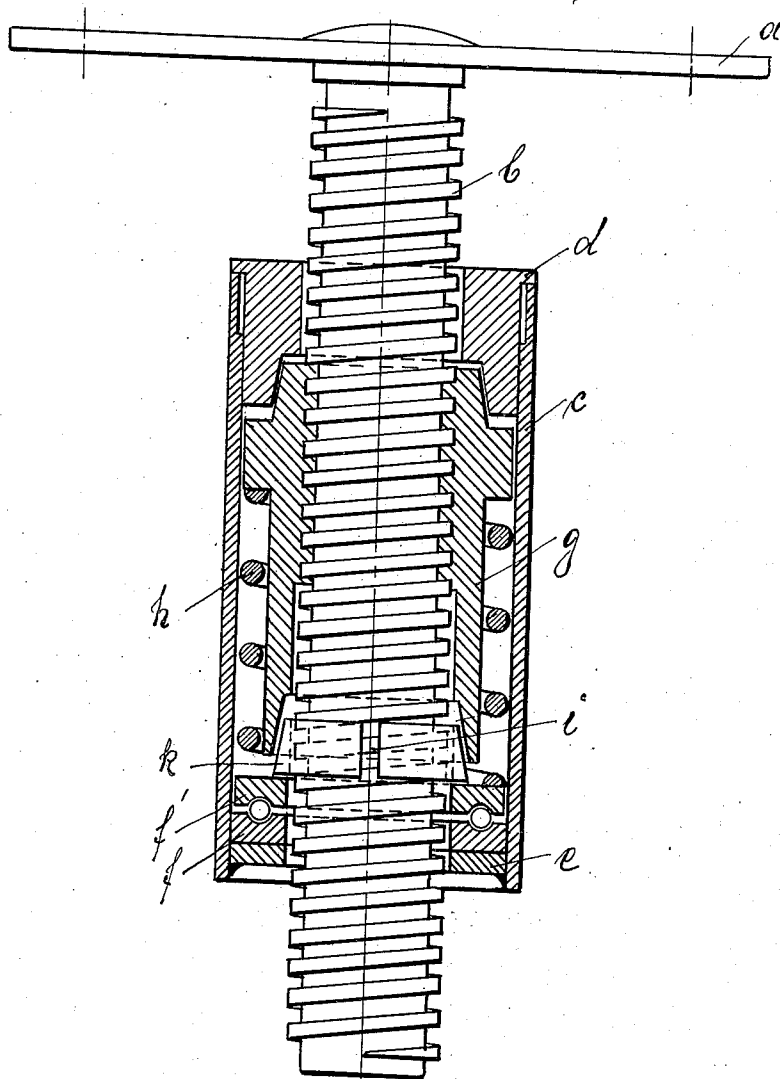
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2 Sheets-Sheet 2

Fig 2.



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AUTOMATIC SCREW ARRANGEMENT FOR
REVOLVING CHAIRS AND THE LIKE

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8 Claims. (Cl. 155—93)

In all revolving chairs heretofore known, the screw device is so constructed that on turning the seat the same is raised or lowered according to the direction in which it is turned, whether the chair carries a load or not. This, of course, is a disadvantage, because, on using the chair, the user may by involuntary movements turn the chair all around and thus cause the seat to be brought to an unsuitable level. For this reason, various constructions have been suggested to obviate this defect, but all these constructions are deficient in that they require external devices which by certain manual movements put the screw mechanism out of operation and which are unattractive and thus mar the appearance of the chair. For the above reasons none of these constructions has solved the problem in a satisfactory manner and they have therefore not found extensive use.

The purpose of this invention is to avoid the above mentioned drawbacks and to create an automatically operating screw device functioning in such manner that the seat will not be raised or lowered on turning the same when it carries a load and which will operate without requiring any manual manipulations; also the device according to this invention has no protruding parts or handles projecting from the symmetrical form of the chair, rendering its appearance less attractive.

The accompanying drawings illustrate two exemplary embodiments of the invention.

Fig. 1 is a vertical sectional view of a screw device according to this invention; and

Fig. 2 is a vertical sectional view of another embodiment of the screw device according to the invention.

In the figures, *a* is the seat which is rigidly attached to the screw spindle *b*, the latter being threaded substantially throughout its entire length. *c* is a tube surrounding the whole device, attached at the top to the end piece *d*, and at the bottom to the end piece *e*, which latter simultaneously serves as an annular support for the ball or other antifriction thrust bearing *ff'*. Both end pieces are provided with holes for the spindle but are not threaded. Between the two end pieces there is situated a nut *g*, wholly or partly threaded and conical at both top and bottom ends. When the chair is not used, i. e. when the seat has no load, the spiral spring *h* will press the nut *g* upwardly against the top end piece *d*, whereby both parts *g* and *d* will be rigidly interconnected by a conical coupling. Thus, if the seat, having no load, is turned round and thus

also the threaded screw, spindle *b* is rotated, the seat will be raised or lowered depending upon the direction of the rotation because the threads of the spindle will glide along the threads of the nut *g*, the latter being held in a fixed position since it is coupled with the top end piece *d* and the tube *c*, the latter serving also as a support for the legs of the chair.

In the embodiment illustrated in Fig. 1, the bottom part of the nut *g* is provided with incisions *i* and is conically shaped so that a rigid coupling may be obtained between the nut *g* and the top portion *f'* of a suitable antifriction thrust bearing, such as the ball bearing *f*. The rigidity of this coupling is ensured by the spring-like action of the projecting segments which are formed by the incisions *i*, whereby these segments expand into and grip against the conical socket formed centrally in the top bearing portion *f'*. According to the second embodiment shown in Fig. 2, a conical ring *k* is placed on the top portion *f'* of the ball bearing whereby the same may be coupled to the nut *g*, the bottom part of the latter being similarly conical. This conical ring *k* is also provided with incisions *i*, serving to expand the ring *k* outwardly into firm engagement with the conical annulus formed at the bottom of the bore of the nut *g*.

If the chair seat is loaded, the spring *h* will be compressed and the coupling between the nut *g* and the top end piece *d* is disconnected and the nut *g* will be pressed downwardly and coupled with the ball bearing either directly as shown in Fig. 1 or by the aid of the ring *k* as shown in Fig. 2. The lower portion of the nut *g* having incisions and the ring *k*, Fig. 2, having similar incisions, a very stable connection will be established between the threads of the spindle and the top portion *f'* of the ball bearing *f*. Therefore, when in this loaded state the seat and thus the spindle is turned, the threaded nut *g* will rotate with the spindle on the ball thrust bearing *ff'* and thus the level of the seat will remain unchanged, whether the seat be turned in one direction or the other.

It is evident from the above description that a screw device is obtained which operates wholly automatically and noiselessly and which, when the seat is loaded, remains at a fixed level, while, on the other hand, the seat may easily be adjusted into the desired level when the chair carries no load. The spiral spring may, of course, be of a strength appropriate to the load and, if desired, may be adjustable to vary its strength.

Both above described embodiments of the in-

vention may be varied without deviating from the idea of the invention which is specially characterized in that a threaded nut through which the screw spindle runs, is coupled (a) by the force of a spring with a stationary part of the device so that the spindle on rotating will be raised or lowered, or (b) by the load on the seat so that the nut together with the threaded spindle are coupled to one portion of a bearing thus preventing the spindle from gliding in the nut, both rotating on the bearing, the thread being thus inactive and the spindle with the seat remaining at its determined level even though the seat is rotated.

As seen in Fig. 1 a nut *n*, operable by a handle *l*, may be arranged above the nut *g*, bearing against the latter by the aid of a ball ring or a ball bearing *m*. By the aid of this nut it is possible to fix the nut *g* in the desired position, for instance, in the same position in which the chair is when it carries a load.

Having described the invention, what is claimed is:

1. A height-adjusting device for a rotatable chair having a seat and a base, which device is operable when the seat is unloaded, and is inoperable when the seat is loaded; comprising a tube fast to said base, a screw spindle fast to said seat and extending through said tube, a top end piece fast in said tube, a thrust bearing fast in said tube near the bottom thereof, a nut threaded on said spindle and disposed in said tube between said top end piece and said thrust bearing, and a spring within said tube and bearing against said nut in such manner as to tend to lift the latter into firm engagement with the top end piece, to lock the nut against the base, so that when the unloaded seat is revolved, the spindle attached thereto rotates in said immobilized nut, while when the seat is loaded, the nut is forced down, along with said spindle, away from the top end piece, into contact with the thrust bearing, in which it rotates idly, along with the spindle.

2. A height-adjusting device for a rotatable chair having a seat and a base, which device is operable when the seat is unloaded, and is inoperable when the seat is loaded; comprising a tube fast to said base, a screw spindle fast to said seat and extending through said tube, a top end piece fast in said tube, a thrust bearing fast in said tube near the bottom thereof, a nut threaded on said spindle and disposed in said tube between said top end piece and said thrust bearing, the said nut being conically shaped at each end thereof, and the cooperating surfaces of both the top end piece and the thrust bearing being complementary-shaped, so as to ensure positive engagement therebetween, and a spring within said tube and bearing against said nut in such manner as to tend to lift the latter into firm engagement, along the complementary conical surfaces thereof, with the top end piece, to lock the nut against the base, so that when the unloaded seat is revolved, the spindle attached thereto rotates in said immobilized nut, while when the seat is loaded, the nut is forced down, along with said spindle, away from the top end piece, into positive contact, along the complementary conical surfaces thereof, with the thrust bearing, in which it rotates idly, along with the spindle.

3. A height-adjusting device for a rotatable chair having a seat and a base, which device is operable when the seat is unloaded, and is inoperable when the seat is loaded; comprising a tube fast to said base, a screw spindle fast to said seat

and extending through said tube, a top end piece fast in said tube, a thrust bearing fast in said tube near the bottom thereof, a nut threaded on said spindle and disposed in said tube between said top end piece and said thrust bearing, the top end of said nut being conically shaped and the cooperating surface of the top end piece being complementary-shaped, the said nut having longitudinal incisions along the lower portion thereof, to impart outward resiliency thereto, the bottom segments of the nut, as defined by said incisions, being inwardly and conically tapered, and a complementary conical-shaped recess being provided in the cooperating top surface of the thrust bearing, so as to ensure positive engagement therebetween, and a spring within said tube and bearing against said nut in such manner as to tend to lift the latter into firm engagement, along the complementary conical surfaces thereof, with the top end piece, to lock the nut against the base, so that when the unloaded seat is revolved, the spindle attached thereto rotates in said immobilized nut, while when the seat is loaded, the nut is forced down, along with said spindle, away from the top end piece, into a positive contact with said thrust bearing, said positive contact being ensured by the spring-like action of the bottom segments of the nut gripping within the conical recess in the thrust bearing, in which bearing the nut rotates idly, along with the spindle.

4. A height-adjusting device for a rotatable chair having a seat and a base, which device is operable when the seat is unloaded, and is inoperable when the seat is loaded; comprising a tube fast to said base, a screw spindle fast to said seat and extending through said tube, a top end piece fast in said tube, a thrust bearing fast in said tube near the bottom thereof, a nut threaded on said spindle and disposed in said tube between said top end piece and said thrust bearing, a spring within said tube and bearing against said nut in such manner as to tend to lift the latter into firm engagement with the top end piece to lock the nut against the base, so that when the unloaded seat is revolved, the spindle attached thereto rotates in said immobilized nut, while when the seat is loaded, the nut is forced down, along with said spindle, away from the top end piece, into contact with the thrust bearing, in which it rotates idly, along with the spindle, and manually-operable means, adapted to be brought into operation at the will of the user, cooperating with said nut to force the latter into an inoperable position, after said spindle has first been adjusted to desired position, to immobilize the said seat against vertical movements when the latter is unloaded.

5. A height-adjusting device for a rotatable chair having a seat and a base, which device is operable when the seat is unloaded, and is inoperable when the seat is loaded; comprising a tube fast to said base, a screw spindle fast to said seat and extending through said tube, a top end piece fast in said tube, a thrust bearing fast in said tube near the bottom thereof, a first nut threaded on said spindle and disposed in said tube between said top end piece and said thrust bearing, a spring within said tube and bearing against said first nut in such manner as to tend to lift the latter into firm engagement with the top end piece to lock the first nut against the base, so that when the unloaded seat is revolved, the spindle attached thereto rotates in said immobilized first nut, while when the seat is loaded,

the first nut is forced down, along with said spindle, away from the top end piece, into contact with the thrust bearing, in which it rotates idly, along with the spindle, a second nut threaded through said top end piece, and fitting loosely about said spindle, and adapted to exert pressure against the top of said first nut, to force the latter into an inoperable position, after said spindle has first been adjusted to desired position, to immobilize the said seat against vertical movements when the latter is unloaded, and a handle attached to said second nut and extending outwardly therefrom, for manipulating said second nut into and out of its operable position.

6. A height-adjusting device for a rotatable chair having a seat and a base, which device is operable when the seat is unloaded, and is inoperable when the seat is loaded; comprising a tube fast to said base, a screw spindle fast to said seat and extending through said tube, a top end piece fast in said tube, a thrust bearing fast in said tube near the bottom thereof, a first nut threaded on said spindle and disposed in said tube between said top end piece and said thrust bearing, a spring within said tube and bearing against said first nut in such manner as to tend to lift the latter into firm engagement with the top end piece, to lock the first nut against the base, so that when the unloaded seat is revolved, the spindle attached thereto rotates in said immobilized first nut, while when the seat is loaded, the first nut is forced down, along with said spindle, away from the top end piece, into contact with the thrust bearing, in which it rotates idly, along with the spindle, an anti-friction bearing at the top of said first nut, of which bearing the top, substantially horizontal surface of said first nut forms part, a second nut threaded through said top end piece, and fitting loosely about said spindle, the under face of said second nut forming part of said anti-friction bearing, said second nut being adapted to bear loosely, through said anti-friction bearing, on the top of said first nut, to force the latter into an inoperable position, after said spindle has first been adjusted to desired position, to immobilize said seat against vertical movements when the seat is unloaded, and a handle attached to said second nut and extending outwardly therefrom, for manipulating said second nut into and out of its operable position.

7. A height-adjusting device for a rotatable chair having a seat and a base, which device is operable when the seat is unloaded, and is inoperable when the seat is loaded; comprising a tube fast to said base, a screw spindle fast to said seat and extending through said tube, a thrust bearing fast in said tube near the bottom thereof, a ring placed on the top surface of said thrust bearing, said ring loosely encircling said spindle and being conically tapered inwardly and upwardly, a nut

threaded on said spindle and disposed in said tube between said top end piece and said thrust bearing, the top end of said nut being tapered inwardly, and the cooperating face of the top end piece having a complementary conical recess into which the conical end of said nut is adapted to fit snugly, the bottom end of said nut being recessed with an outwardly flaring taper complementary to that of said ring, and a spring within said tube and bearing against said nut in such manner as to tend to lift the latter into firm engagement with the top end piece, as a result of the coaction between the complementary tapered portions thereof, to lock the nut against the base, so that when the unloaded seat is revolved, the spindle attached thereto rotates in said immobilized nut, while when the seat is loaded, the nut is forced down, along with said spindle, away from the top end piece, into firm contact, by virtue of the coaction between the complementary tapered ring and recess of the nut, with the thrust bearing, in which the nut rotates idly, along with the spindle.

8. A height-adjusting device for a rotatable chair having a seat and a base, which device is operable when the seat is unloaded, and is inoperable when the seat is loaded; comprising a tube fast to said base, a screw spindle fast to said seat and extending through said tube, a thrust bearing fast in said tube near the bottom thereof, a ring placed on the top surface of said thrust bearing, said ring loosely encircling said spindle and being conically tapered inwardly and upwardly, and having at least one incision disposed transversely in the wall thereof, to impart outward resiliency thereto, a nut threaded on said spindle and disposed in said tube between said top end piece and said thrust bearing, the top end of said nut being tapered inwardly, and the cooperating face of the top end piece having a complementary conical recess into which the conical end of said nut is adapted to fit snugly, the bottom end of said nut being recessed with an outwardly flaring taper complementary to that of said ring, and a spring within said tube and bearing against said nut in such manner as to tend to lift the latter into firm engagement with the top end piece, as a result of the coaction between the complementary tapered portions thereof, to lock the nut against the base, so that when the unloaded seat is revolved, the spindle attached thereto rotates in said immobilized nut, while when the seat is loaded, the nut is forced down, along with said spindle, away from the top end piece, into firm contact, by virtue of the coaction between the complementary tapered ring and recess of the nut, this coaction being enhanced by the incision in the ring, with the thrust bearing, in which the nut rotates idly, along with the spindle.

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