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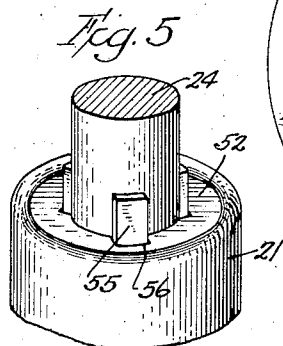
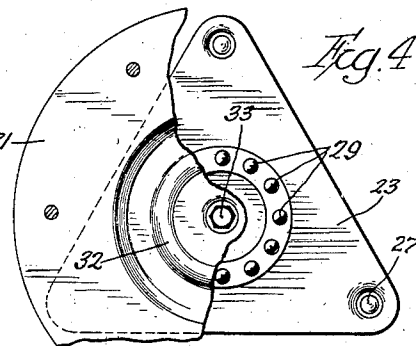
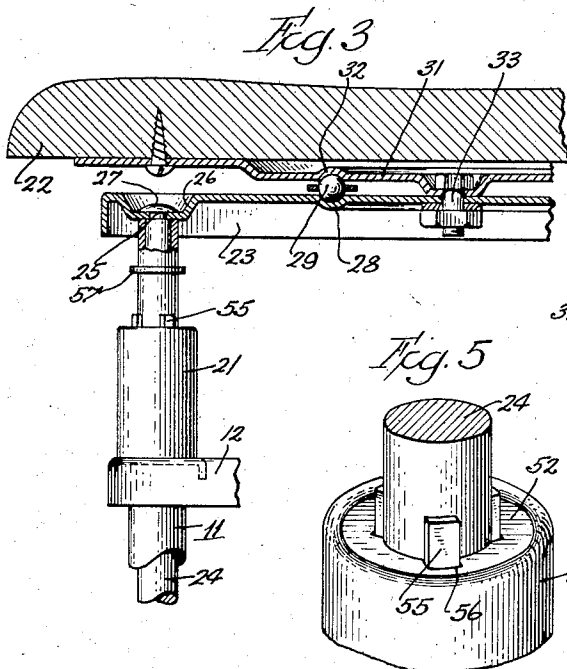
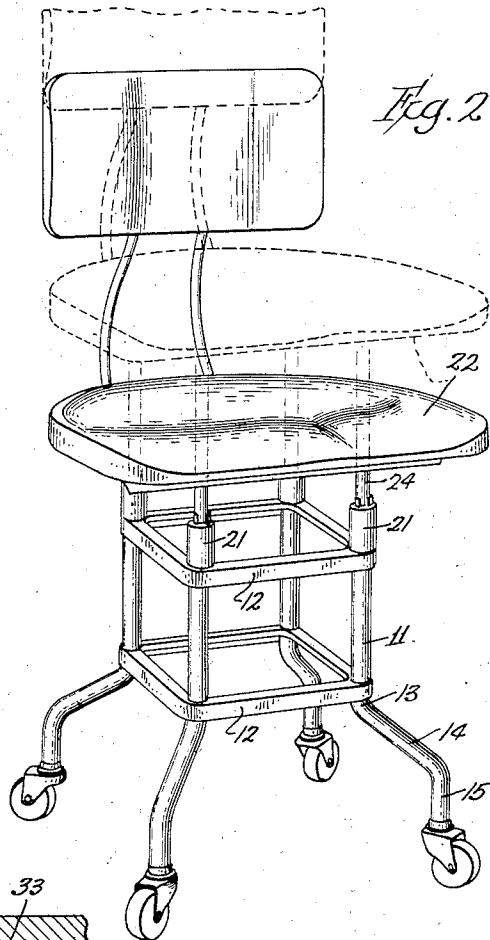
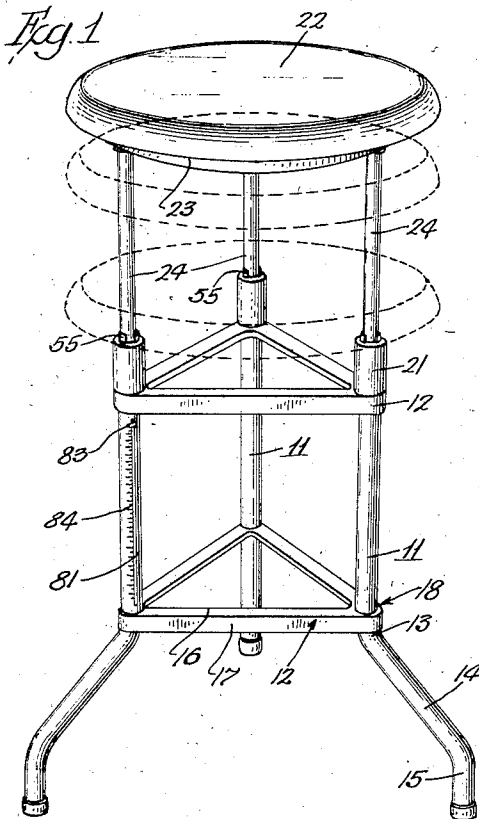
E. J. LEECH

2,010,306

ADJUSTABLE STOOL AND THE LIKE

Filed March 2, 1933

2 Sheets-Sheet 1



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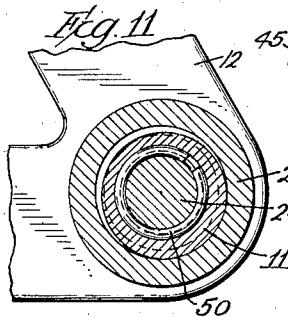
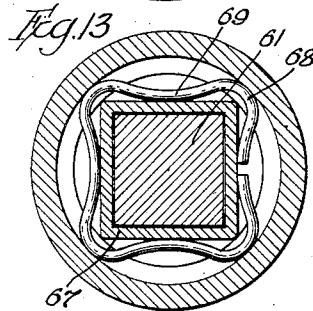
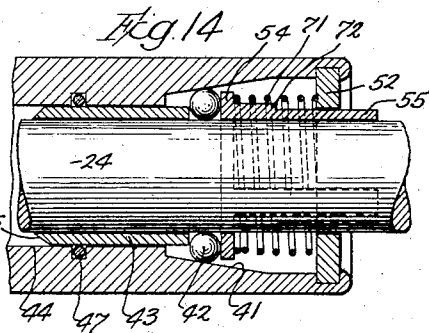
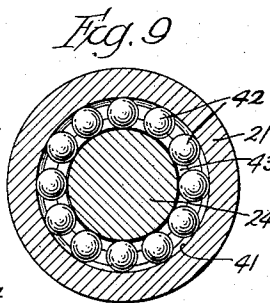
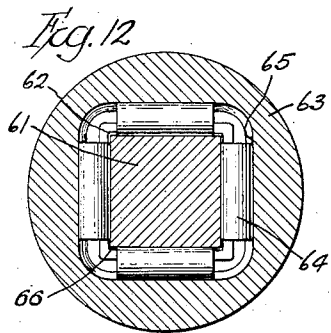
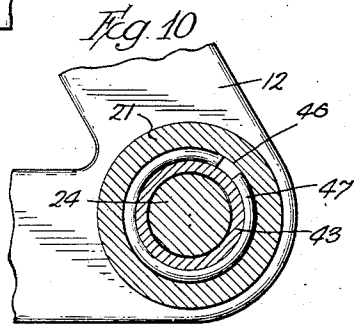
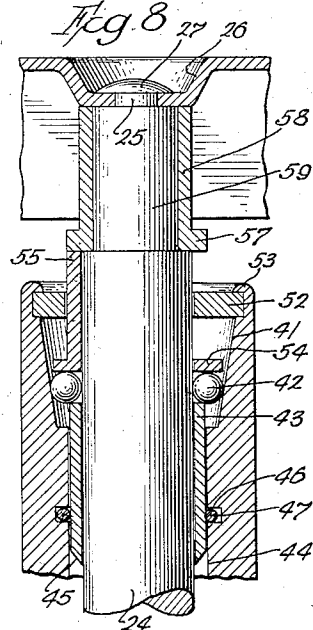
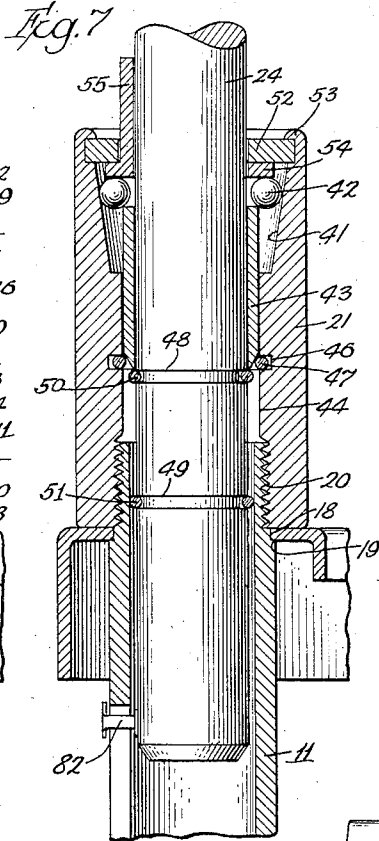
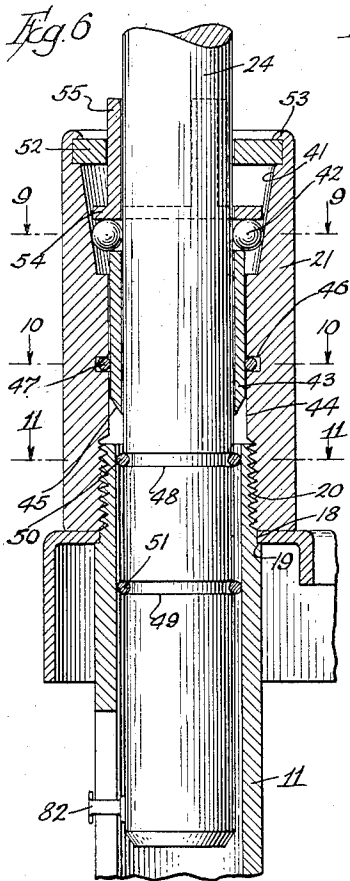
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ADJUSTABLE STOOL AND THE LIKE

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,010,306

ADJUSTABLE STOOL AND THE LIKE

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James A. Campbell, Kewaunee, Wis.

Application March 2, 1933, Serial No. 659,251

1 Claim. (Cl. 155—94)

This invention relates to extensible or adjustable supports, and while it will be hereinafter more particularly explained as embodied in supports for stools adjustable as to height, it will be readily apparent that it has other valuable applications and uses and is easily capable of embodiment in supports in which adjustment vertically, horizontally, or at angles to the horizontal and vertical are desired.

The invention has for a principal object the provision of an adjustable stool or seat which may be adjusted to desired height by merely raising the seat, retaining or locking means of improved construction and operation being provided to support the seat in the desired raised position, together with means automatically operative when the seat is lifted to its full height; to unlock said retaining means to permit lowering of the seat.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figures 1 and 2 are perspective views respectively, of a three-legged stool and a four-legged chair in which the instant invention is incorporated, various positions of the parts being indicated by dotted lines;

Fig. 3 is an enlarged partial vertical section through the upper portion of the stool shown in Fig. 1;

Fig. 4 is a partial top plan view of the seat mounting of the stool;

Fig. 5 is a perspective view of the top of one of the retainer members, the shaft support being shown in section;

Fig. 6 is an enlarged vertical section through a retainer and associated parts, the shaft support being shown in section, and the parts being arranged for supporting the stool or chair in its adjusted positions;

Fig. 7 is a view similar to Fig. 6, showing the automatic arrangement of the parts when the seat is lifted to its full height;

Fig. 8 is a similar view showing the relation of the parts when the seat is lowered to its lowermost position;

Figs. 9, 10 and 11 are transverse sections taken respectively upon the lines 9—9, 10—10 and 11—11 of Fig. 1;

Fig. 12 is a section taken similarly to Fig. 9 and showing the support of a shaft of square sec-

tion and by the use of roller as contra-distinguished from ball members;

Fig. 13 is a section taken similarly to Fig. 10 and showing a shaft square in section and a releasing member of similar construction; and

Fig. 14 is a view similar to Fig. 6 and showing a construction adapted for horizontal as contra-distinguished from vertical extension.

The preferred embodiment of the invention, which is shown in Figs. 1 to 11 of the drawings, is adapted for the adjustable support of stools and chairs and the like and may advantageously be employed when the seat of the stool or chair is supported upon a single pedestal or upon a plurality of supports. In Fig. 1 a three-legged stool is depicted and in Fig. 2 a four-legged chair.

In each of these constructions a rigid base is provided and consists of tubular legs 11 and frame members 12. The legs 11 are or may be of metal tubing bent out beneath the lower frame member at 13 into downward inclination as indicated at 14 and terminate in widely spaced feet 15 to give firm support. Each frame member 12 is or may be but a stamping of sheet metal having skeleton configuration corresponding to the arrangement of the legs. Generally each frame member consists of a horizontal part 16 and an encompassing downwardly extending flange 17. The legs are arranged through openings 18 in the corners of the frame members. The legs and frame members are rigidly connected in suitable fashion. Conveniently the upper frame may be fixed in place by locking it between shoulders 19 formed in the tubular members and the lower ends of the retainers 21 threadedly engaged, as indicated at 20 in Fig. 6, with the ends of the legs extending through the openings 18. As will be presently more fully explained, a retainer is provided at the top of each leg to lock in co-operation with parts carried by it the seat 22 in various adjusted positions.

In the stool of Fig. 1 the seat 22 is freely rotatable upon a top plate 23 which is fixed upon and carried by three supporting shafts 24 that extend down through the retainers 21 and into the legs 11. The upper end of each supporting shaft 24 is or may be reduced in diameter, as indicated at 25 in Fig. 3. This reduced portion of the shaft is disposed through a suitable opening provided within a countersink 26 in the supporting plate 23 and the extremity of the shaft is or may be riveted, as indicated at 27, to hold the parts together. A supporting plate 23 is preferably of the same shape as the frame plates 12, except that it is not cut to skeleton form.

It is or may be provided with a circular recess 28 to provide a raceway for a ball bearing unit 29. The seat 22 is mounted upon an under plate 31 recessed at 32 to provide a companion raceway for the bearing. A king or pivot bolt 33 is arranged at the axis of rotation to hold the parts in fixed rotatable relation.

The preferred form of locking mechanism for supporting the seat in variously vertically adjusted positions is illustrated in detail in Figs. 6 to 11 and is duplicated in each of the legs of the stool.

In this construction the shaft and the adjacent parts are circular in cross-section. The retainer is provided interiorly and near its top with a downwardly converging conical face 41 which converges with the cylindrical face of the shaft. A plurality of balls 42 are arranged between these converging faces to provide free rolling locking members adapted to bind by reason of engagement with the shaft in its downward movement or under the pressure of its load. It is possible to have a single ball or free rolling member to lock the parts in their assumed positions, but a series of them are desirable to eliminate side thrusts or lateral strains. From so much of the construction as is just described, it will be apparent that the seat of the stool may be raised by merely lifting it. This action tends to roll the balls up out of binding relation with the surfaces of the retainer and shaft. The least movement of the shaft in the opposite direction, however, returns them into wedged locking relation to support the shaft, seat, and person sitting upon it.

Means are provided for moving the balls 42 or other free rolling members out of operative position and to hold them from engagement when it is desired to lower the stool. In the instant embodiment of the invention this means comprises a sleeve 43 arranged between the inner cylindrical surface 44 of the retainer beneath the conical or converging wall 41 and the adjacent face or outer cylindrical surface of the supporting shaft 24. The lower end of the sleeve 43 is tapered, as indicated at 45. A recess 46 is cut circumferentially in from the surface 44 of the retainer and a spring ring member 47 is arranged in this recess to contract inwardly about the sleeve and frictionally hold it in assumed positions.

The lower end of the supporting shaft 24 is slotted circumferentially at 48 and 49 to receive rings 50 and 51 which form protruding shoulders and the dimension of the parts is such that these shoulders fit nicely and easily in sliding engagement within the bore of the leg. The upper ring 50 is so located that when the seat of the stool is nearing the end of its upward travel the ring 50 engages the sharpened edge 45 of the lower end of the sleeve 43 and moves the sleeve upwardly so that its top edge engages and lifts the balls out of position for locking contact with the converging surfaces of the sleeve and shaft. In this movement the sleeve is carried past the friction ring 47 into the position shown in Fig. 7. The seat of the stool may now be lowered without obstruction by the balls to its lowermost position. Means are provided to automatically return the sleeve into inoperative position so that the balls or free rolling members may re-engage to lock in successive adjusted positions as the seat is again raised.

The chamber in which the balls are contained is closed at the top by an annulus 52 arranged

about the shaft and firmly engaged at 53 with the upper open end of the retainer. A ring 54 is arranged about the shaft and above the balls 42 and is provided with a plurality of upwardly extending arms 55 which are arranged through slots 56 cut in the annulus 52 for the purpose. The ring member 54 is freely movable through the annulus and rests upon the balls at all times and serves during the adjustments of the seat to press the balls into engagement with the converging surfaces. The ring member 54 is lifted with the balls as they are elevated by the sleeve 43, and the top limit of movement of the seat is reached when the ring member engages the inner face of the annulus 52. As the supporting shaft is moved down, the ring member is held in this top position by the sleeve acting through the balls. When the seat approaches the lower end of its travel, a shoulder 57 extending out circumferentially at the top beyond the body of the shaft engages the tops of the upwardly extending arms 55 and forces the ring member, the balls, and the sleeve downwardly, as may be illustrated in Fig. 8, and until the balls limit the downward movement by wedging between the converging surfaces. As a result of this movement, normal arrangements permitting the adjustments described are re-established. The shoulder 57 is or may be provided upon a bushing 58 arranged about a reduced top portion 59 of the shaft, as may be observed in Fig. 8.

Various forms of shafts and various forms of free rolling members may be provided. Attention in this respect is called to Figs. 12 and 13 as illustrative constructions, although it will be apparent that other forms also might be employed. In these two figures the shaft indicated by reference character 61 is square in transverse section and accordingly fits into a square bore 62 in the retainer 63. Either balls or roller members 64 may be provided between the converging surface 65 of the retainer and the presented face 66 of the supporting shaft. The sleeve which lifts the rollers out of operative position, which is indicated at 67, likewise is or may be of square inner and outer configuration. The spring member 68 conveniently is of general rectangular shape with its sides 69 bent in for pressure engagement with the flat presented surfaces of the sleeve 67. Thus constructed, the parts operate exactly in the manner already described and Figs. 6, 7 and 8 may be taken to be vertical central sections through the structures of Figs. 12 and 13.

As has been earlier suggested, the invention has or may have valuable use when arranged horizontally for supporting bodies in various adjustable positions. All that is necessary for horizontal arrangement is the provision of means to insure that the balls or other free rolling members maintain contact both with the converging surface and the shaft surface. This may be accomplished as illustrated in Fig. 14, by the arrangement of a spring 71 between the ring member 54 and the closure annulus 52. It is desirable to provide shoulders 72 on the arms 55 to stop the outward movement of the sleeve, independently of the spring 71 and before it is compressed to solid condition.

Stools of the character shown in Fig. 1 are not infrequently used in laboratories and other places where it is important that the user may quickly arrange the stool in the same adjustment upon different occasions, and accordingly indicated means are or may be provided. A slot 81 is ar-

ranged through one of the legs 11 and between the frames 12. An indicator 82 secured to the lower end of the supporting shaft 24 is arranged through the slot 81 and has a pointer 83 overlying a scale 5 84 provided upon the outer face of the leg along side the slot. Repeated adjustment of the height of the seat may be accomplished by bringing the pointer 83 to the same scale reading upon successive occasions.

10 It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts 15 without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

20 In an extensible construction, the combination of a supporting shaft movable axially for adjust-

ment, a retainer fixed in position and embracing said shaft and having an inner surface angularly arranged with respect to said shaft, a free rolling member arranged between the angularly disposed face of the retainer and the presented 5 face of the shaft, a member movable longitudinally of said shaft and seated on said free rolling member and having a part extending beyond the retainer, a sleeve embracing the shaft within the 10 retainer and frictionally engaged with the retainer, means operating at the end of movement of the shaft in one direction and actuating said sleeve to move said free rolling member into an enlarged portion of said retainer and out of locking 15 position, and a shoulder arranged at the outer end of the shaft for engaging said part beyond the retainer upon movement of the shaft in the opposite direction to move said sleeve to an inoperative position and said free rolling member 20 into operative position.

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