July 22, 1941. M. W. HARD 2,250,223

THEATER CHAIR

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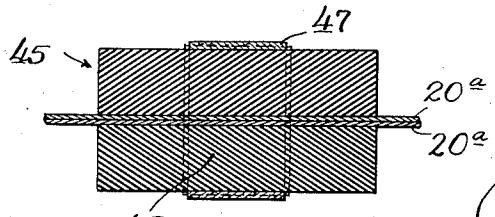


Fig. 17

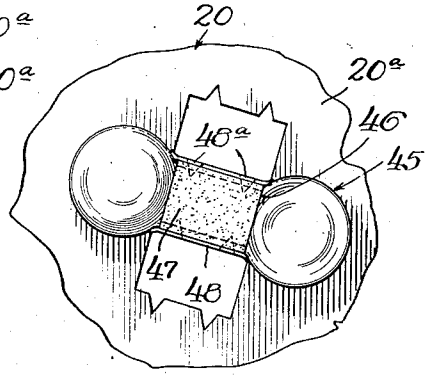
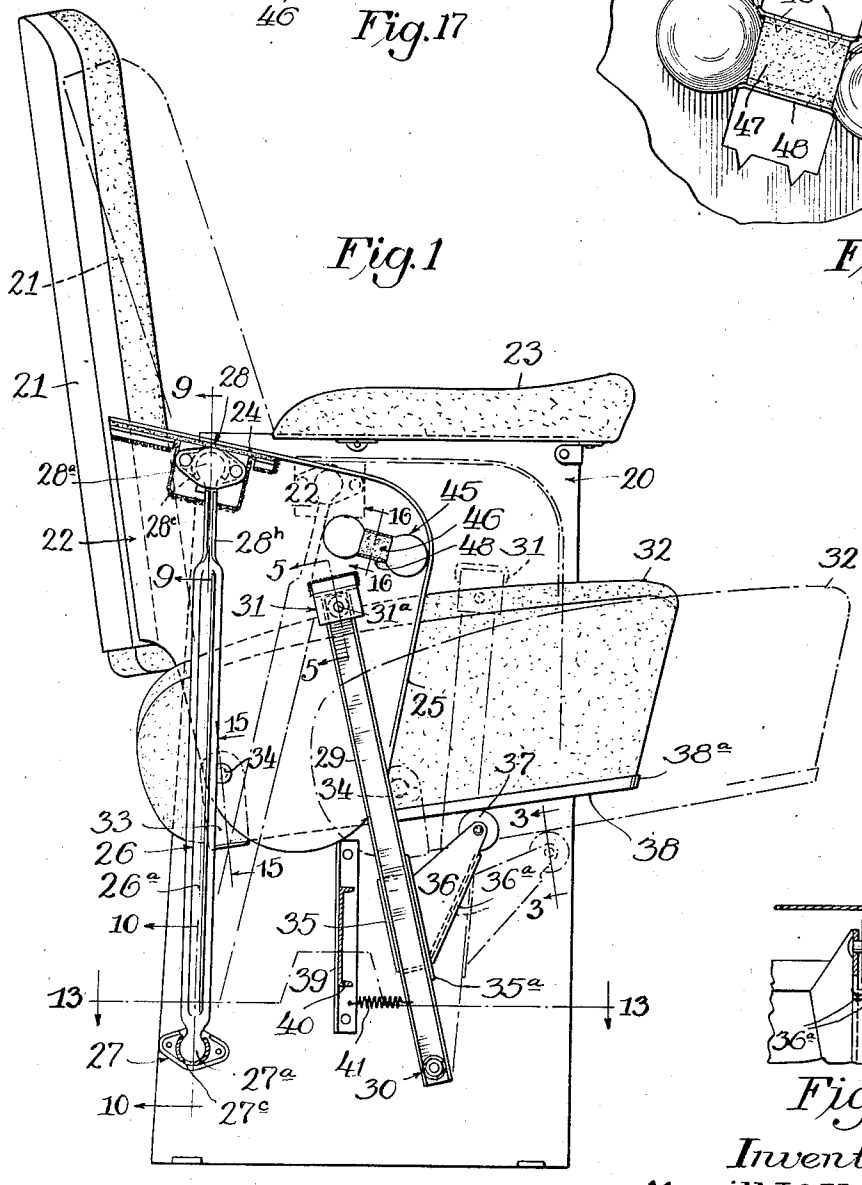


Fig. 18



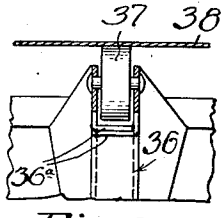


Fig. 3

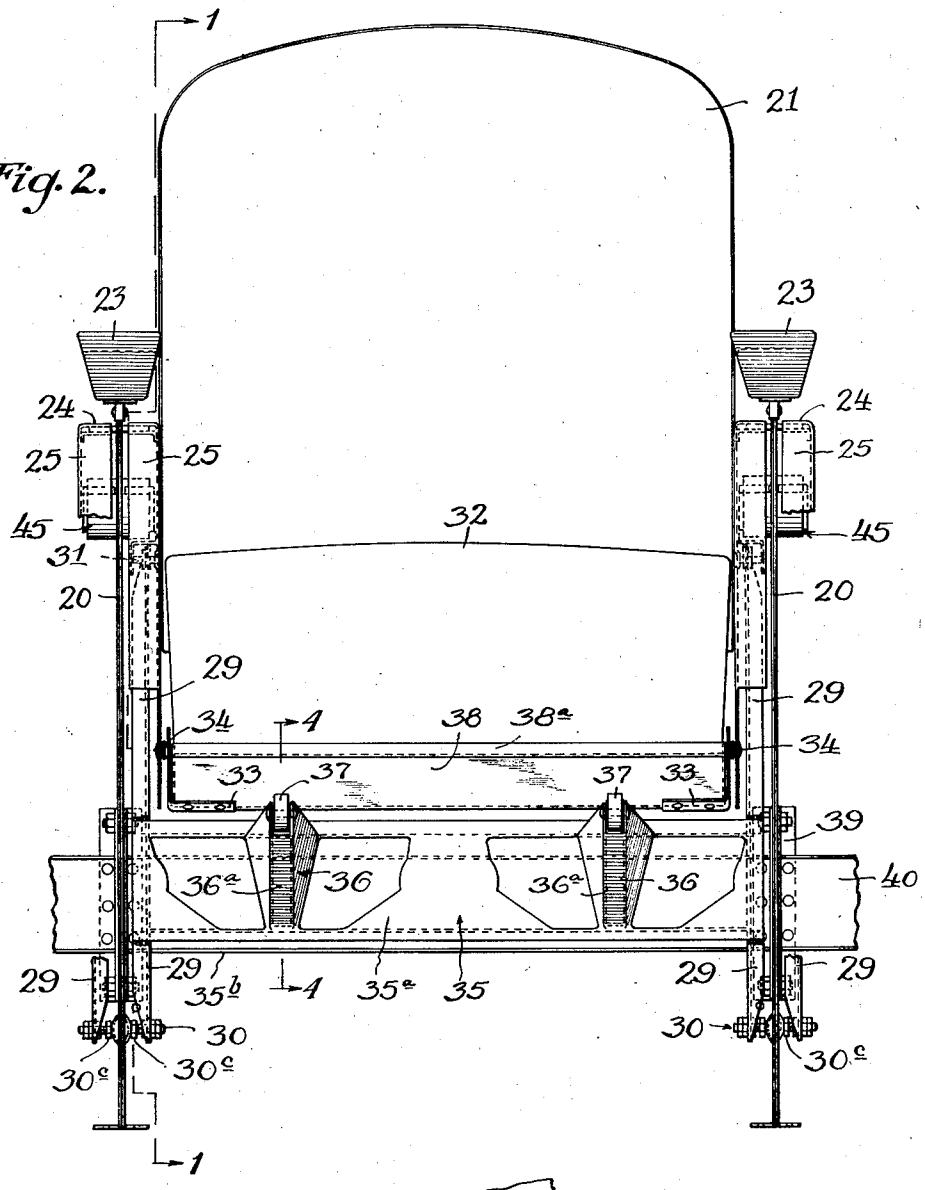
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THEATER CHAIR

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Fig. 2.



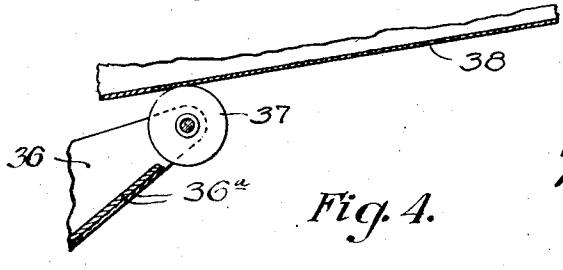


Fig. 4.

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THEATER CHAIR

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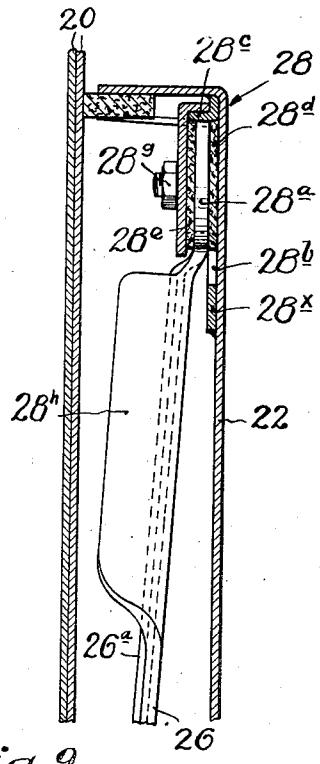


Fig. 9.

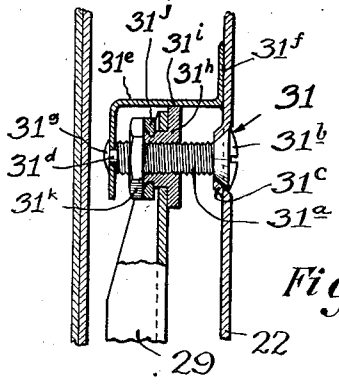


Fig. 5.

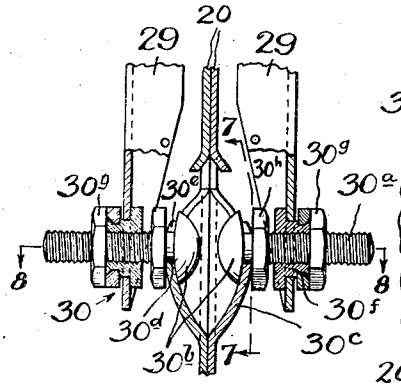


Fig. 6.

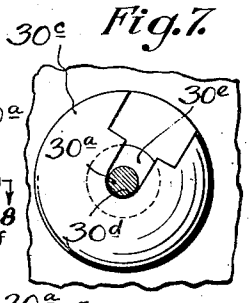


Fig. 7.

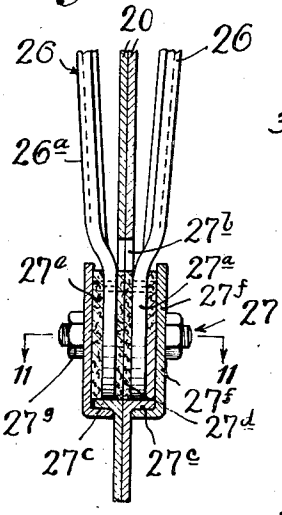


Fig. 10.

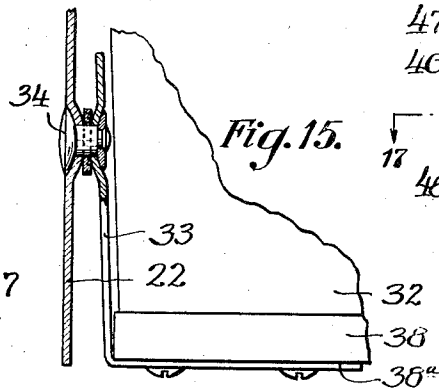


Fig. 15.

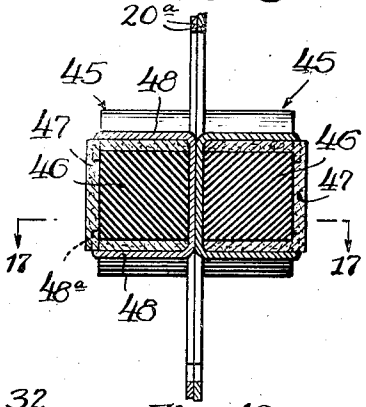


Fig. 16.

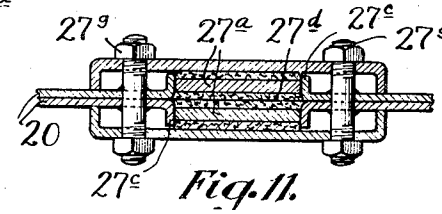


Fig. 11.

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THEATER CHAIR

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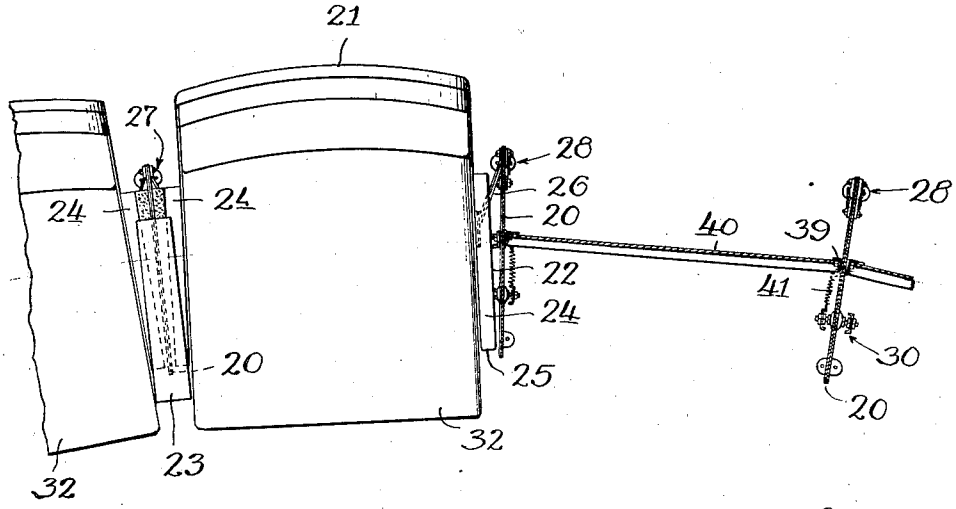


Fig. 13.

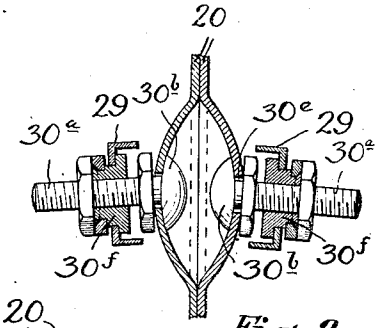


Fig. 8.

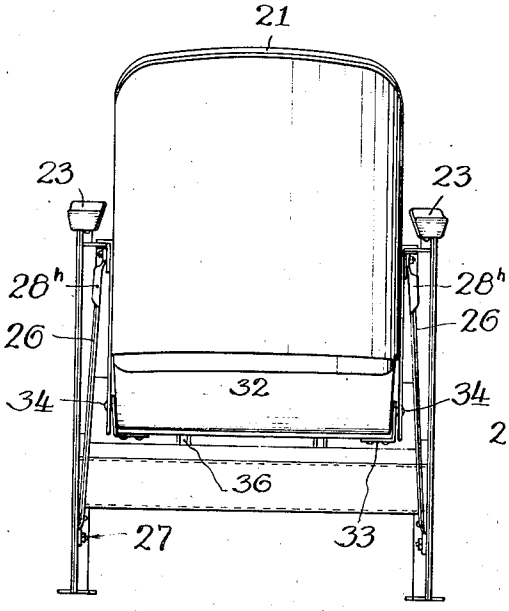


Fig. 14.

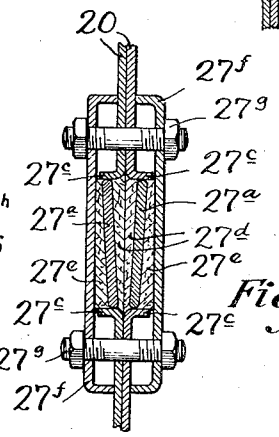


Fig. 12.

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Patented July 22, 1941 2,250,223

UNITED STATES PATENT OFFICE

2,250,223

THEATER CHAIR

Merrill W. Hard, Los Angeles, Calif.

Application December 8, 1938, Serial No. 244,517

6 Claims. (Cl. 155—115)

This invention relates to chairs and more particularly to chairs of the character employed in theaters, auditoriums and the like, where the chairs are set in a series of rows and where the rows are generally disposed in the form of an arc of a circle.

The invention relates particularly to improvements in the type of chair disclosed in my Patent No. 2,098,623 granted November 9, 1937.

In the chair shown and described in my aforesaid patent, the normal position of the chair is one where the seat is at the forward limit of its movement, whether occupied or not. One object of the present invention is to provide a chair of the kind including means which will automatically withdraw the seat to its rearmost position when the occupant rises, which position the seat will retain at all times except when occupied. Thus ample space is presented between the rows of chairs when the occupants arise, to permit their easy passage between the rows without interference by the forwardly projecting seats.

Another object of the invention is to standardize and simplify the parts included in such chairs so that they may not only be manufactured economically and at low cost, but the chairs may be installed on the floor of a theater, auditorium or the like with a minimum expenditure of labor and time.

The advantages of the invention will appear more fully as I proceed with my specification.

In the drawings:

Figure 1 is a side elevation of the improved chair showing it with the seat in retracted position in full lines, and in dotted lines with the back and seat in the position they have when the chair is occupied.

Figure 2 is a front elevation of the same.

Figure 3 is a fragmentary section in a plane indicated by the line 3—3 of Figure 1.

Figure 4 is a fragmentary section of the details shown in Figure 3, the plane of the section being indicated by the line 4—4 of Figure 2.

Figure 5 is an enlarged detail section in a plane indicated by the line 5—5 of Figure 1.

Figure 6 is an enlarged detail section in a plane indicated by the line 6—6 of Figure 1.

Figure 7 is a sectional elevation in a plane indicated by the line 7—7 of Figure 6.

Figure 8 is a horizontal detail section taken in a plane indicated by the line 8—8 of Figure 6.

Figure 9 is a detail sectional elevation showing the parts for mounting the upper end of a standard.

Figure 10 is a detail sectional view showing the mounting of the lower ends of standards of adjacent chairs.

Figure 11 is a detail sectional view in a plane indicated by the line 11—11 of Figure 10.

Figure 12 is a detail sectional view in a plane similar to Figure 11, but with the parts in different relation.

Figure 13 is a view partly in plan and partly in horizontal section in a plane indicated by the line 13—13 in Figure 1 showing the relative positions of the parts when set on pedestals disposed at a sharp angle and spaced wide apart.

Figure 14 is a rear elevation of a chair showing the relative fitted position of the standards to accommodate a rather wide linear spacing.

Figure 15 is an enlarged detail sectional view, the plane of the section being indicated by the lines 15—15 of Figure 1.

Figures 16 and 17 are, respectively, enlarged detail sectional views of a bumper, Figure 16 being in a plane indicated by the line 16—16 of Figure 1, and Figure 17 being in a plane indicated by the line 17—17 of Figure 16.

Figure 18 is a side elevation of said bumper, as attached to a pedestal.

Referring now to that embodiment of the invention illustrated in the drawings: 20 indicates the side pedestals upon which a chair is mounted. Two of such pedestals are required for each chair; but when arranged in a row a single pedestal between adjacent chairs serves for both. A pedestal 20 may be of any suitable construction, as a hollow shell or a solid panel; but in this case, and as illustrated, each panel is made of adjacent flat metal sheets 20^a, 20^a which are secured together in any convenient manner.

21 indicates the chair back. Said back has rigidly connected to it side plates or members 22 which project forwardly in association with and below fixed arm rests 23 at the tops of the pedestals 20. Each side member has a top horizontal flange 24 which projects forwardly from the back 21 and is continued downwardly at the forward end of the side member by a vertical web 25. 26, 26 indicate vertical standards, each of which is pivotally mounted at its bottom end at 27 on an associated pedestal 20, and at its upper end is pivotally mounted at 28 below the flange 24, on the associated side plate or member 22 of the chair back 21.

29, 29 indicate links, each of which is pivoted at its bottom end at 30 on the adjacent pedestal 20, and at its top end at 31 on the adjacent side plate 22. 32 indicates the seat. Said seat is pivotally suspended from the side plates 22 by means of a hanger 33 (see Figures 1 and 15) fixed transversely to the bottom of the seat and pivoted at 34 to said side plates. The pivoted hanger 33 is located near the rear end of the seat 32 between the standards 26 and the links 29.

The links 29 are rigidly connected and braced so as to be held in parallel relation by a cross bar 35 (see Figure 2) consisting of spaced front and black plates 35^a, 35^a, which are welded or otherwise secured to the front and back sides of

the links 29 below the seat 32. The bar 35 is provided with laterally spaced, forwardly projecting arms 36, 36 which carry at their front ends bearing rollers 37, 37 engaged against the flat bottom 38 of the seat which is inclined upwardly and forwardly and provided preferably with a sheet metal shoe 38a for rolling contact with said rollers 37. 45 indicates a double ended bumper (see Figure 1) fixed to each pedestal 20 in the space between it and the associated side plate 22. Said bumper is adapted to be engaged at its forward end by the vertical flange 25 of said plate 22 to limit and determine the rearward movement of the seat 32, and to be engaged at its rear end by the upper end of the standard 26 to limit and determine the forward movement of said seat.

The standards 26 and the links 29 and their points of pivotal connection to the pedestals 20 and to the side members 22 of the chair back, as well as the position of the bumper 45, are so designed and correlated that when the chair and seat, arrested by said bumper 45, are in the forward position, as shown in dotted lines in Figure 1, the upper ends of the links 29 are slightly forward of the dead center above their bottom pivotal points 30; the bearing rollers 37 are well forward of such dead center; and the upper ends of the standards 26 are well forward of dead center above the pivotal points at their lower ends. When the seat is retracted and arrested in its rearmost position, as shown in full lines in Figure 1, the top ends of the links 29 have passed rearwardly beyond their dead center; the bearing rollers 37 are arrested short of such dead center; and the standards 26 are arrested short of or before they pass dead center. Thus there is a slight rising and then falling movement of the top pivotal ends of the links 29 in a short, flat arc as they pass from forward position to rearward or retracted position, and a sharper rise of the top pivotal ends of the standards 26 as they approach their rearward limit of movement. As a result the seat 32 travels in a substantially horizontal plane as shown by comparing the position of the seat when forward, as when occupied, shown in dotted lines in Figure 1, with its position when retracted, as shown in full lines.

The construction thus far described, except for the means for bracing and supporting the seat at its forward end, is in substance the same as that described and illustrated in my aforesaid Patent No. 2,098,623.

Somewhat back of the median vertical plane of the pedestal 20, as shown in Figures 1 and 13, is located a channel bar 39 which extends between the two pedestals and is secured at its ends by rivets or otherwise to angle bars 40 which in turn are bolted to the pedestals. This structure provides a strong connection between the pedestals. Each link 29 shortly above its bottom pivotal point 30, as shown in Figure 1, is connected, as illustrated, to one of the angle bars 40 by a coiled spring 41. Said coiled springs are opposed in their operation to the forward movement of the seat 32 when actuated by the weight of an occupant of the chair. In other words, said springs 41 oppose the movement of the chair seat 32 from the position shown in full lines, to the position shown in dotted lines in Figure 1. But they act in aid of the occupant when retracting the seat as heretofore, to permit someone to pass between him and a seat directly in front of him. And the tension of the springs is so gauged that when the occupant arises from the seat, said springs will overcome the normal tendency of the seat to remain in its forward position arising from the pivotal supports and their relative arrangement as heretofore described, and retract the seat to and retain it in its rearmost position, as shown in full lines in Figure 1. Thus when the chairs in the rows are unoccupied, there is ample space for passage between the rows.

Passing now to certain details of construction: The standards 26 and their top and bottom pivotal connections at 28 and 27, respectively, are shown enlarged in Figures 9, 10, 11 and 12. The standards 26 are each made of thin flat bar metal with an upset central stiffening rib 26a running lengthwise of it. Each standard has upper and lower bearing heads 28a and 27a, respectively, which are flat and rounded, the rib 26a terminating short of them as shown in Figure 1. Said heads are disposed in parallel planes with the main length of the standard inclined at a slight angle between them, as shown in Figures 9 and 10.

The heads 28a, 27a are engaged in bearing recesses lined with rather heavy felt which gives flexibility enough to form universal bearings for the upper and lower heads of the standards within the limits required. The bearing structure at the lower end is shown particularly in Figures 10 and 11. Here openings 27b are punched through the two sheets of metal forming the pedestal 20, and the metal is punched out to form arcuate bearing flanges 27c which partially surround the openings. The extent of the flange is shown in Figure 1. In the opening 27b between the bearing heads 27a there are placed two thicknesses of felt 27d. Outside each bearing head 27a is placed another thickness of felt 27e. The bearing heads 27a rest vertically on the bearing flanges 27c, and the outer felts 27e are held laterally against the bearing heads 27a by confining boxes 27f which are held in place by the bolts 27g.

The flexibility of the bearing resulting from the felt lining will be obvious upon a comparison of Figure 11 where the bearing heads are in parallel relation, with Figure 12 where said heads are in angular relation.

The bearing box for the upper bearing end or head 28a of the standard is substantially the same as the one for the lower end, except that here there is only one inner felt 28d which rests against the side plate 22. This bearing felt 28d is confined in an opening 28b in a piece of metal 28× which is welded to the side plate 22. And the piece 28× has an arcuate bearing flange 28c struck up just like the flange 27c and extending as shown in Figure 1. The outside bearing felt 28e is held in place by the box 28f and bolts 28g. Near the upper end each standard 26 has a bent-out flange portion 28h to act as a flat striker for the bumper 45.

Both bearing heads 27a and 28a are joined to the standard 26 proper by narrow necks, and both upper and lower bearing flanges 27c and 28c preferably extend around more than half the circumference of the heads, as shown in Figure 1, so that when the parts are finally assembled and installed, the seat cannot be accidentally lifted off the upper ends of the standards, nor can the lower ends of the standards be pulled out of their bearings.

The main lengths of the standards are somewhat angled as heretofore described, with reference to the parallel bearing ends or heads 27a, 28a, so as to put the parts in about the relative position required for an average installation. For

wider or narrower spacing between the pedestals, the felt washers of the bearings yield enough to accommodate the different spacing without setting up any undue strains between the standards and their bearing heads and bearing supports. And for varying relative angular positions of the pedestals when setting up and installing the chairs, the bearing heads of the standards may be adjusted as in the case of any pivotal mounting for universal movement within the limits required, by reason of the felt lining or washers. This appears as to the lower pedestal bearings **27** by comparing the position of the heads **27a** in Figure 12 with that shown in Figure 11. The same thing of course applies to the upper pivotal bearings **28**.

Passing now to the pivotal bearings at the top and bottom of the links **29**: The upper pivot **31** (see Figure 5) is a pivot screw or bolt **31a** with a counter-sunk head **31b** equipped with a screw-driver slot. This head rests in the counter-sunk stamped opening **31c** in the side plate **22**. The other end of the pivot bolt is reduced in size at **31d** and has rotatable bearing in a bracket **31e** which is welded at **31f** to the side plate **22**. The end of the pivot bolt is riveted over at **31g** so as to hold the pivot bolt in place.

On the pivot bolt **31a** is an internally threaded bearing sleeve **31h** which has at one end a hexagon or square-shaped flange **31i**. The upper end of the link **29** has a bearing aperture which takes the sleeve **31h**. To keep the link **29** on the sleeve there is a confining washer **31j** which is held on the sleeve by riveting or heading over the end of the sleeve as shown in Figure 5. Thus, the sleeve **31h** forms the bearing member for the upper end of the link **29**. The said sleeve may be adjusted longitudinally of the pivot bolt **31a** by turning the pivot bolt and thus screwing the sleeve in either direction along the pivot bolt. The sleeve is kept from rotating by the engagement of a flat face of its flange **31i** with the bracket **31e**. When the bearing sleeve has been adjusted to the correct position, a lock nut **31k** is set up against the end of sleeve **31h**, and this prevents the sleeve and the pivot bolt from any relative rotation that will get the parts out of proper adjusted position.

With the two links **29** rigidly joined by the cross bracing **35**, the adjustments at the two opposite upper pivots **31** of a chair should not be used to spread or draw together the upper ends of the two links **29** to such degree as would put the links under bending tension and set up friction and wear at the upper ends of the links where they bear on the sleeves **31h**. But the adjustments at the upper ends of the links do at least provide for adjusting the general lateral position of the chair itself with reference to the links, or vice versa, and therefore facilitate making the proper adjustments to get the chair in the most desirable adjusted lateral position between its two pedestals, and at the same time to get the lower ends of the links in such lateral position with reference to the chair and the two pedestals as to make the lower ends of the links come within the ranges of adjustability of the two opposite lower pivots **30** which support the particular chair in question.

Each lower pivot **30** (see Figures 6 and 7) also has a pivot bolt **30a** with a head **30b** that lies inside a pressed-out portion **30c** of the sheet metal plate **20a** of pedestal **20**. The bolt extends out through an opening **30d** having a radial slot **30e** open at its upper end wide enough for insertion of the bolt head. The slot has its open end up so that the bolt cannot drop out, and is angled somewhat at one side of the vertical to be in a convenient position to reach for insertion, as shown in Figure 7.

The bolt **30a** is mounted in an internally threaded bearing sleeve **30f** which in detail is just like the one previously described; and a lock nut **30g** is provided for locking the bearing sleeve on the bolt. There is also a lock nut **30h** on the bolt in the position next its head as shown in Figure 6.

Assuming that the upper ends of the links have been adjusted in the desired position relative to the chair itself; and that the pedestals have been set on the floor in the desired spacing and also relative angular (circular formation) positions; then the lower pivots are adjusted as follows: The lower pivot bolts **30a** are threaded into the bearing sleeve **30f** in such a position that when the chair is put in place between the two opposite pedestals, each of the bolt heads **30b** will then fit loosely or spacedly behind the metal portions **30c**, the lock nut **30h** being run back so that it will be outside **30c**. Then while both the lock nuts are loose, the bolt **30a** is turned until the bolt head **30b** is brought up into proper position against **30c**. During this operation the links **29** are of course hanging freely in the positions in which they have been adjusted by adjustment of the upper pivots, and when the bolt heads **30b** are run up just snugly against **30c** the links are not strained at all. In other words, in this adjusted position of the parts, the lower bearing sleeve **30f** is directly below the upper bearing sleeve **31h**, so that all the parts are in positions where they are not strained and no frictional pressures are set up that would wear the parts. Also it will be noted that the two lower pivot bolts **30a** are lined up with each other by the initial operation of inserting them in the bearing sleeves **30f** which are held in apertures in the lower ends of the two links **29**. Thus, no matter what may be the relative angular positions of the two opposite pedestals, and no matter what may be their spacing (in the direction along the row of chairs) the two lower pivot bolts in the case of each chair are lined up (see Figure 13) and the lower bearings of the links are directly below the upper link bearings. With the parts all thus adjusted, the two lock nuts **30h** and **30g** are then set up tightly and the parts are then secured in permanent adjusted position.

In Figure 8 is shown the relative angular positions of the pivot bolts **30a** with relation to the pedestal **20**, to accommodate relative angular positions of the opposite pedestals. Note that the width of the slots **30e** is slightly greater than the diameters of bolts **30a** so as to accommodate the slight tipping of the bolts in adjustments.

The construction of the bumper **45** is shown in detail in Figures 16, 17 and 18. It is preferably made of rubber, is flat on its two vertical faces and is reduced at its top and bottom edges to provide a neck **46**. The plate **20a** of the pedestal to which the bumper is attached is cut out to provide plates **48** adapted to be folded down into engagement with the top and bottom edges of the neck **46** of the bumper. Preferably there is interposed between said plates a U-shaped strip of felt **47** which embraces the top and bottom edges of the bumper neck **46** and covers the vertical face of said neck adjacent to the associated side plate **22**. The plates **48** are provided with

detents 43a which are embedded in the felt beyond the face of the neck 46 to lock said felt in place. The structure is duplicated on each side of a pedestal as shown in Figures 16 and 17, where the pedestal provides support for a chair at each side of it.

The members 36 which carry the bearing rollers 37 are preferably formed by cutting out strips of metal suitably formed from the forward plate 35a of the bracing bar 35 and bent towards each other, each being provided with a wing 36a, the one overlapped upon and secured to the other. (See Figures 2, 3 and 4.) A very rigid and at the same time economical construction is thereby provided.

While in describing my invention I have referred to many details of mechanical construction and arrangement of parts, it is to be understood that the invention is not limited thereto except as may be pointed out in the appended claims.

I claim as my invention:

1. In a chair including a pair of pedestals, a pair of upright standards mounted at their lower ends on said pedestals, a chair back having rigid side plates mounted on the upper ends of said standards, said standards being made of flat bars having flat bearing heads at their ends, means providing bearing recesses respectively in said side plates and in said pedestals, each including an annular flange for engagement by the associated head, boxes enclosing said heads, and lining means for each recess permitting a limited amount of universal movement of the bearing head.

2. In a chair including a pair of pedestals, a pair of upright standards mounted at their lower ends on said pedestals, a chair back having rigid side plates mounted on the upper ends of said standards, said standards being made of flat bars having flat bearing heads at their ends and said pedestals being made of sheet metal, said bearing heads being parallel and disposed at an angle to the main length of a standard, means providing bearing recesses respectively in said side plates and in said pedestals, each including an annular flange for engagement by the associated head, said flange for the bottom head being stamped from the metal of the pedestals, boxes enclosing said heads, and compressible lining discs, a pair for each head disposed on opposite sides thereof adapted to permit a limited amount of universal movement of the bearing head.

3. In a chair comprising a pair of pedestals, a pair of upright standards mounted for pivotal movement at their lower ends on said pedestals, a chair back having rigid side plates mounted for pivotal movement on the upper ends of said standards, a seat pivotally connected to said side plates, a pair of upright links forward of said standards pivotally connected at their upper ends to said side plates and at their lower ends to said pedestals, the means for the pivotal connection at the top and bottom of each link including a threaded bolt, a bearing sleeve and lock nut by means of which the ends of said link may be adjusted horizontally, and means for supporting the bottom bolt including an apertured dome-shaped plate with an entryway wider than the diameter of said aperture whereby said bolt may be introduced into said aperture with its head within said bearing plate, and a second lock nut adapted to lock said bolt to the associated pedestal.

4. In a chair comprising a pair of pedestals, a pair of upright standards mounted for pivotal movement at their lower ends on said pedestals, a chair back having rigid side plates mounted for pivotal movement on the upper ends of said standards, a seat pivotally connected to said side plates, a pair of upright links forward of said standards pivotally connected at their upper ends to said side plates and at their lower ends to said pedestals, the means for the pivotal connection at the upper end of each link comprising a horizontal screw taking through said plate, a bracket projecting laterally from said plate supporting the end of said screw, a non-rotative sleeve on which said link has bearing, and a lock nut on said screw adapted for engagement with said sleeve, and the pivotal connection for the bottom end of said link comprising a bolt, a bearing sleeve and lock nut on said bolt, said bolt having a head and a second lock nut adjacent said head, and means providing an apertured support for said screw adapted to be engaged between said head and said second lock nut, said means being provided with a slot opening into said aperture.

5. In a chair comprising a pair of pedestals made of sheet metal, a pair of upright standards mounted for universal pivotal movement at their lower ends on said pedestals, a chair back having rigid side plates mounted for universal movement on the upper ends of said standards, a seat pivotally connected to said side plates, a pair of upright links forward of said standards pivotally connected at their upper ends to said side plates and at their lower ends to said pedestals, the means for the pivotal connection at the top and bottom of each link including a screw bolt, bearing washer and lock nut by means of which the ends of said link may be adjusted horizontally, and means for supporting the bottom bolt including an apertured dome-shaped plate stamped from said sheet metal with a diagonal entryway wider than the diameter of said aperture whereby said bolt may be introduced laterally into said aperture with its head within said dome-shaped plate, and a second lock nut adapted to lock said bolt in varying angular positions to hold the bolts on opposite pedestals in alignment.

6. In a chair comprising a pair of pedestals, a pair of upright standards mounted for pivotal movement at their lower ends on said pedestals, a chair back having rigid side plates mounted for pivotal movement at the upper ends of said standards, a seat pivotally connected to said side plates, a pair of upright links forward of said standards pivotally connected at their lower ends to said pedestals and at their upper ends to said side plates, a cross bar rigidly connecting and bracing apart said links including front and back sheet metal plates secured at their ends to said links, laterally spaced, forwardly projecting arms consisting of strips of metal cut from said front plate and bent towards each other and provided with overlapping wings secured together, and rollers carried by said arms adapted for engagement with the bottom of said seat.

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