D. R. COLLIER.

CHAIR IRON.

APPLICATION FILED MAY 2, 1918.

1,287,640.

Patented Dec. 17, 1918

4 SHEETS—SHEET 1.

Fig. 2.

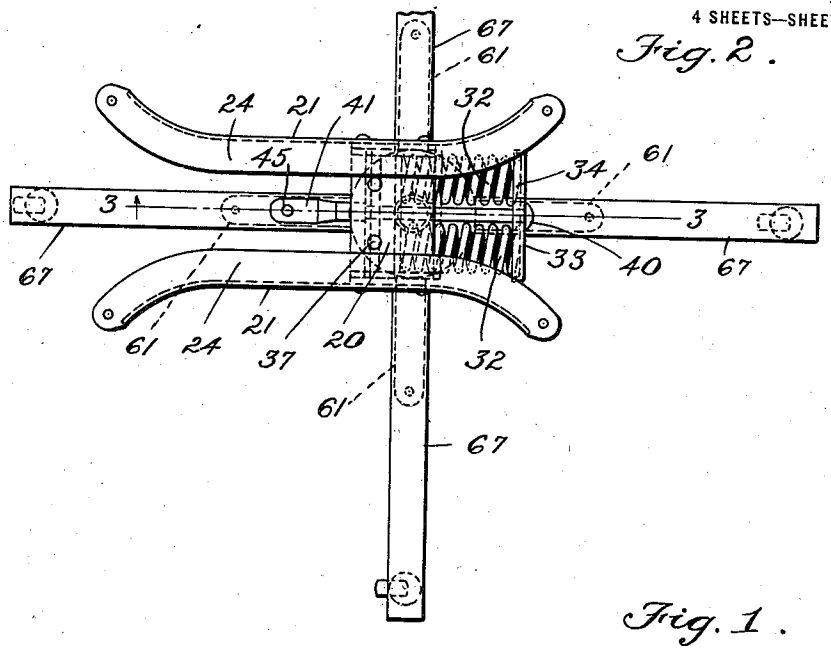
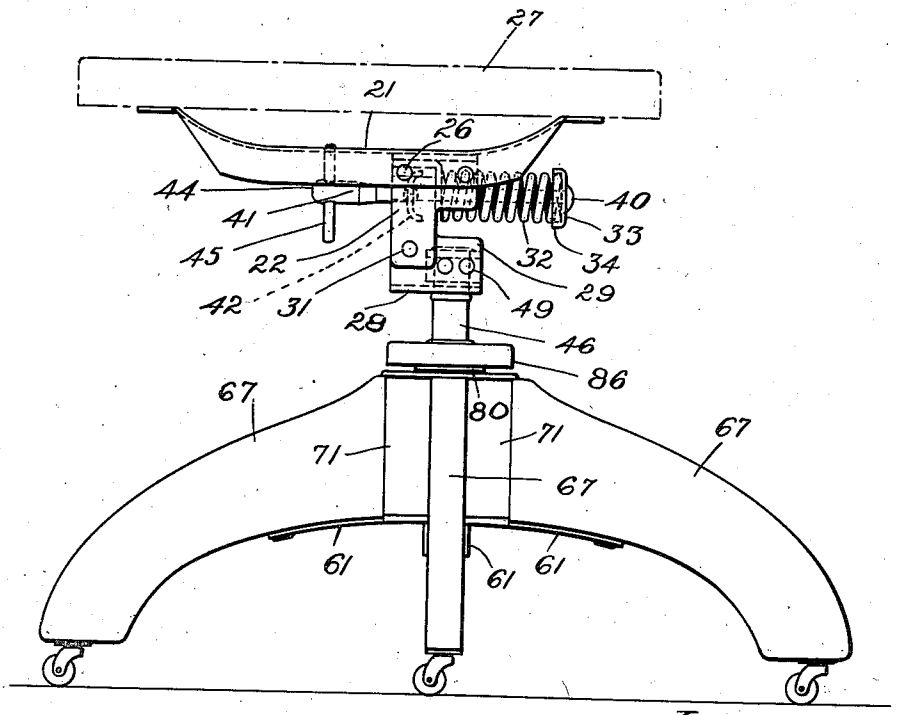


Fig. 1.



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4 SHEETS—SHEET 2.

Fig. 3.

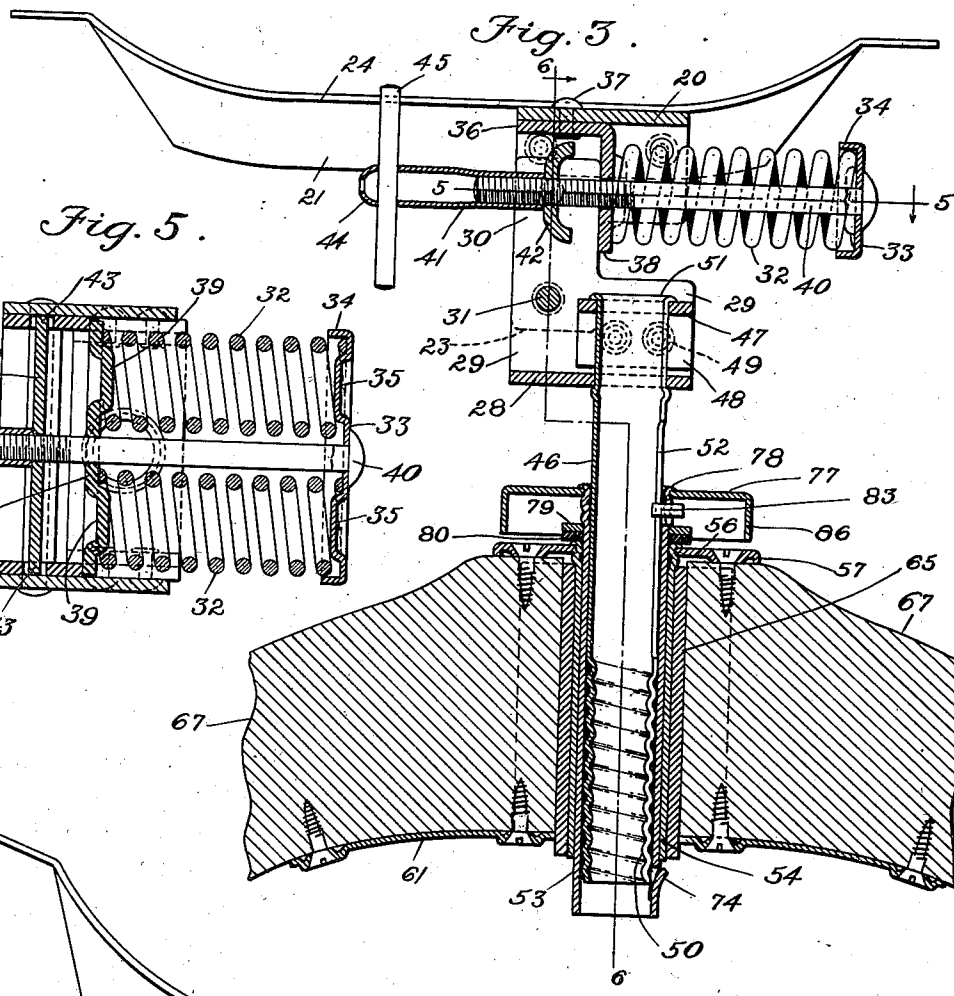


Fig. 5.

Fig. 4.

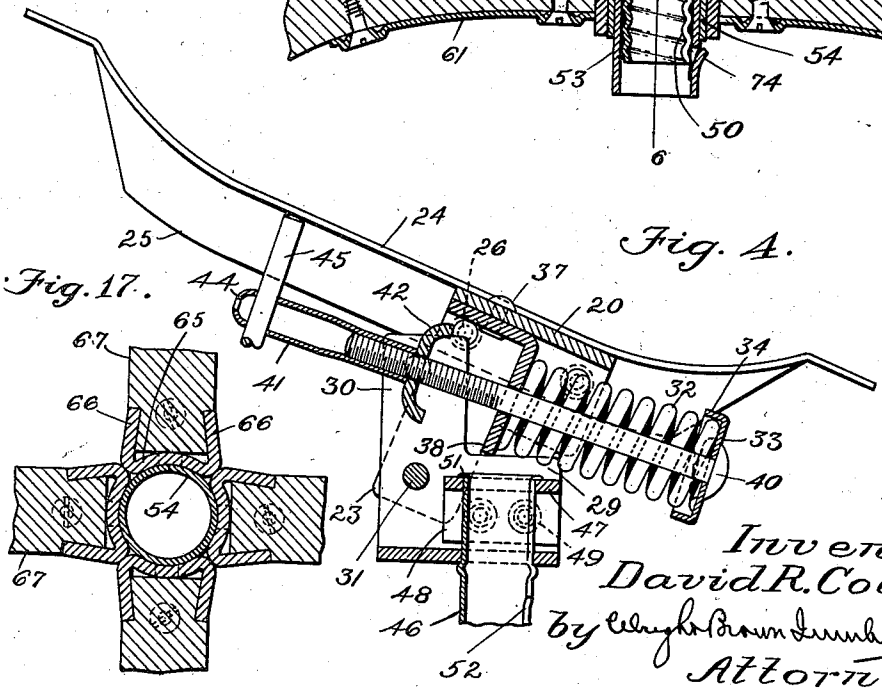


Fig. 17.

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4 SHEETS—SHEET 3.

Fig. 6.

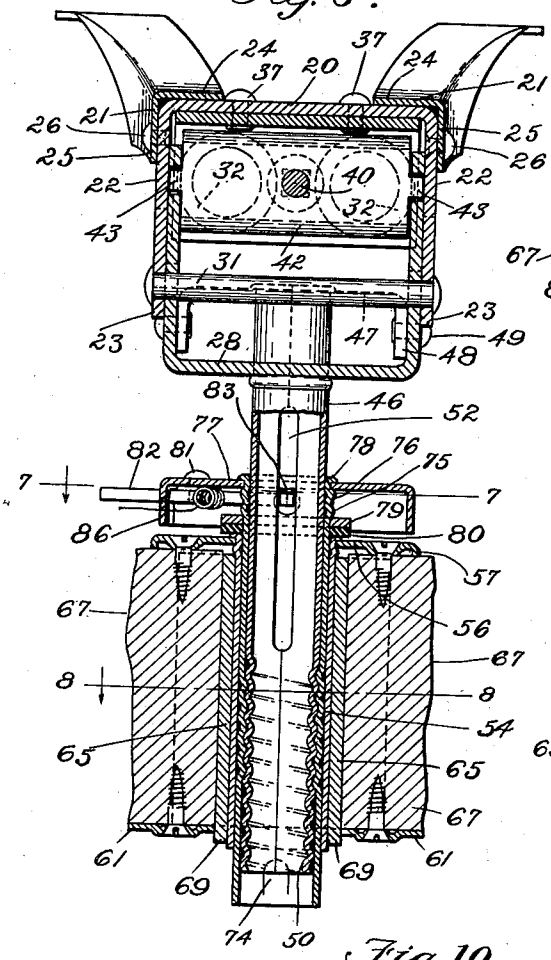


Fig. 7.

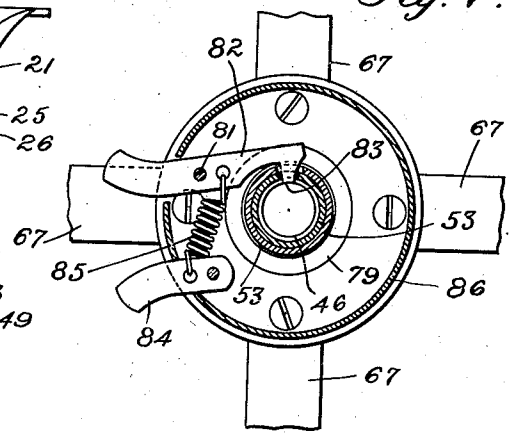


Fig. 8.

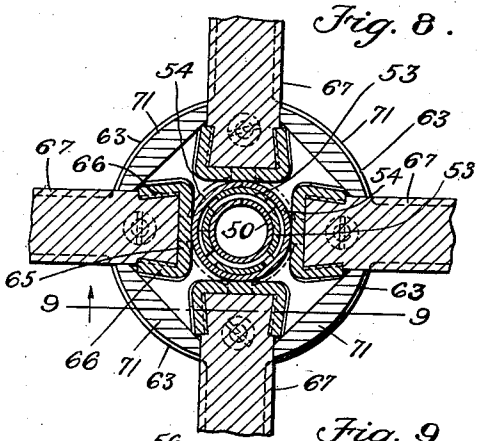


Fig. 9.

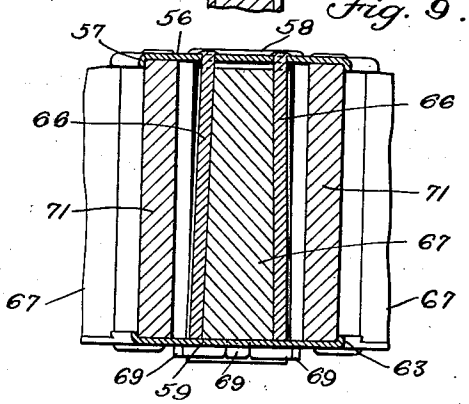


Fig. 10.

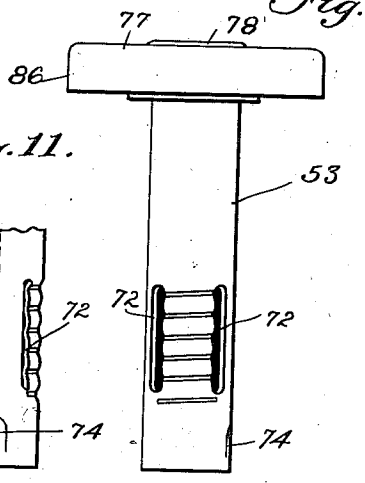
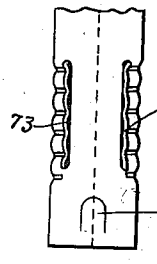


Fig. 11.



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4 SHEETS—SHEET 4.

Fig. 12.

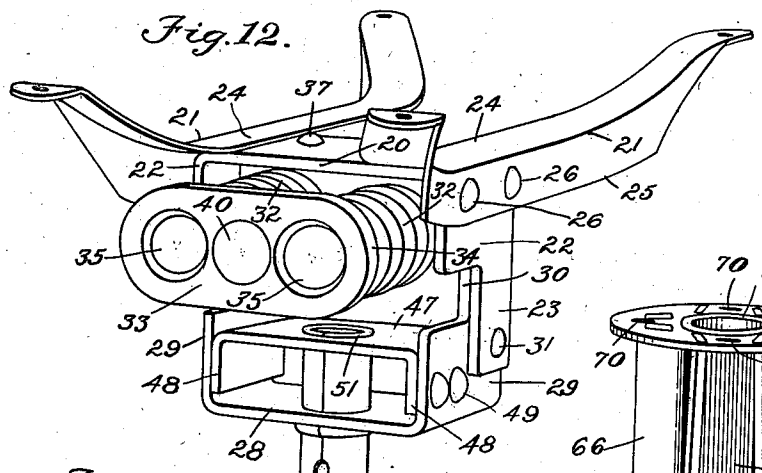


Fig. 13.

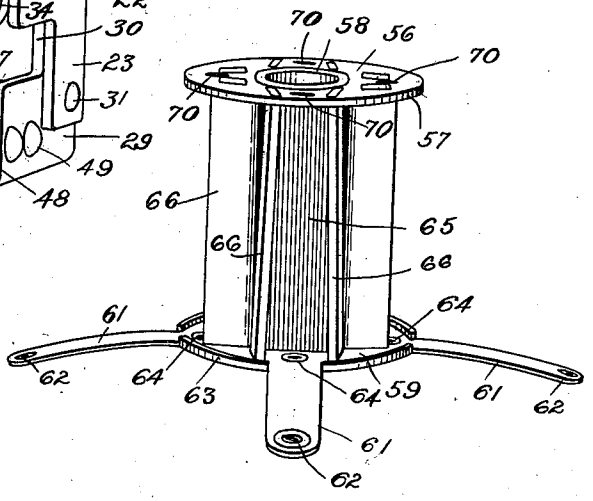


Fig. 16.

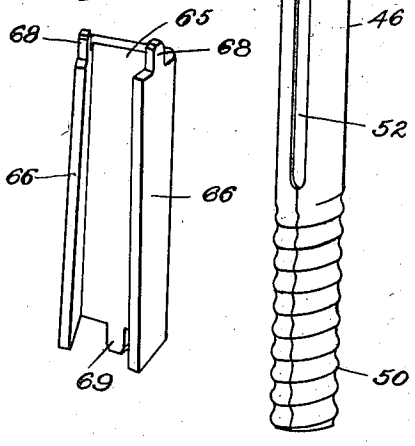


Fig. 14.

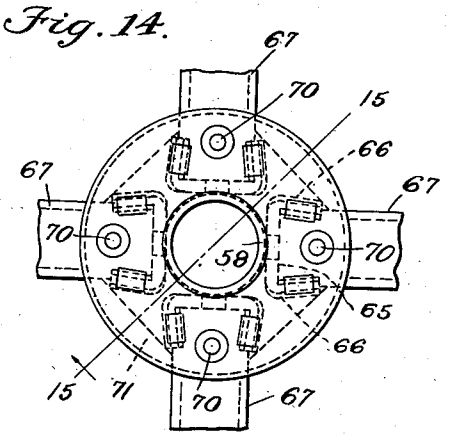
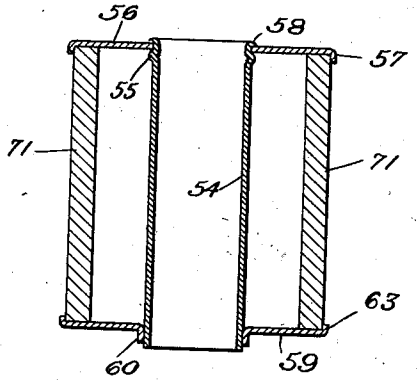


Fig. 15.



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UNITED STATES PATENT OFFICE.

DAVID R. COLLIER, OF GARDNER, MASSACHUSETTS, ASSIGNOR TO COLLIER-KEYWORTH COMPANY, OF GARDNER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

CHAIR-IRON.

1,287,640. Specification of Letters Patent. Patented Dec. 17, 1918.

Application filed May 2, 1918. Serial No. 232,020.

To all whom it may concern:

Be it known that I, DAVID R. COLLIER, a citizen of the United States, residing at Gardner, in the county of Worcester and State of Massachusetts, have invented new and useful Improvements in Chair-Irons, of which the following is a specification.

This invention has relation to chair irons, and has for its object to provide certain improvements therein by which strength and lightness in construction may be secured and a decrease in the cost of manufacture effected.

Referring to the drawings,—

Figure 1 represents in side elevation a portion of a chair embodying the invention, a portion of the seat being indicated by broken lines.

Fig. 2 illustrates a plan view of the same.

Fig. 3 represents a longitudinal vertical section through the chair iron on the line 3—3 of Fig. 2, but on a larger scale.

Fig. 4 represents a similar section, of the head and spider, with the latter in a tilted position.

Fig. 5 represents a horizontal section on the line 5—5 of Fig. 3.

Fig. 6 represents a transverse vertical section through the structure on the line 6—6 of Fig. 3.

Figs. 7 and 8 represent horizontal sections on the lines 7—7 and 8—8 respectively of Fig. 6.

Fig. 9 represents a vertical section through the base hub on the line 9—9 of Fig. 8.

Fig. 10 shows the nut detached.

Fig. 11 represents a side elevation of the lower end of the nut.

Fig. 12 is a perspective view showing the screw spindle, the head thereon and the spider.

Fig. 13 is a perspective view showing the base hub.

Fig. 14 represents a plan view of the latter.

Fig. 15 represents a vertical section through the hub on the line 15—15 of Fig. 14.

Fig. 16 is a perspective view of one of the channel bars detached.

Fig. 17 (Sheet 2) represents a section through a form of hub in which no spacers are employed.

The structure which will now be described is entirely formed of sheet metal, stamped and bent or drawn into shape, as a result of which lightness and a maximum of strength are obtained. This structure includes the base hub, the screw spindle or standard, and the head thereon, the nut and its adjuncts by which the nut may be locked to the spindle to rotate freely therewith relatively to the hub, and the spider which is pivoted to the head and on which the chair seat is secured.

The spider, as illustrated, consists of a spreader 20, and the two angle bars 21, 21. The spreader consists of a flat sheet metal bar having its end portions bent downwardly at right angles to the body thereof to form two arms 22, 22 and thereby constitute an inverted yoke. The extremities of the arms are reduced in width to form depending ears 23. The bars 21 of the spider have each a web or flange 24 which rests upon the spreader and a vertical web or flange 25 which is secured by rivets 26 to the side arms of the spreader. Thus each angle bar fits upon the corner of the spreader. The ends of the bars 21 are bent upwardly and outwardly and are flattened so that they may be secured to the under side of a chair seat such as indicated by broken lines at 27 in Fig. 1, the vertical webs being beveled at the ends, as shown in the last-mentioned figure.

The spider is tiltingly supported by a head consisting of a plate 28 having upwardly bent arms 29 terminating in ears 30, and thus constituting a yoke sufficiently small to fit within the spreader. A pintle 31 passes through apertures in the ears 23 of the spider and through the arms 29 of the head, the parts being so located that the ears 23 of the spider overlap the ears 30 of the heads and are in parallelism, when the parts are in normal positions. The ends of the pintle 31 are upset or handed over, permanently to hinge the spider and the head together.

The compression springs 32, 32, are shown as two in number, and their outer ends bear against a spring plate 33 having a maginal flange 34 for strength and hollow bosses 35 to extend into the end convolutions of said springs. The inner ends of the springs bear against a fixed spring angle-plate, the horizontal web or flange 36 of which is riveted

against the under side of the body of the spreader by rivets 37, and the vertical web or flange 38 of which has hollow bosses 39 to enter the inner end convolutions of said springs. This angle-plate is in length less than the distance between the side arms of the spreader (see Fig. 5), but is long enough so that the ends of the vertical web may engage the upstanding ears 30 of the head which thus serve as stops to limit the movement of the spider in one direction about the pintle 31. The lower edges of the ends of the web or flange 38, when the spider is tilted, engage the top portions of the side arms of the head, as shown in Fig. 4, which serve as stops to limit the tilting movement of the spider in the other direction. Thus the vertical web or flange 38 plays in the angle formed by the ends of the arms 29 and the ears 30, and is limited in its movement or stopped thereby. A bolt 40, located midway between the springs 32, is passed through the plate 33 and the vertical web of the spring angle-plate, and is provided at its end with a tubular nut 41. The head end of the bolt is angular in cross sections and fits a complemental aperture in the plate 33. The end of the nut bears against a cross plate 42, which is transversely curved to give it additional strength, and the ends of which are secured to the upstanding ears 30 of the head. If desired, the cross plate may be mounted so as to tilt, and for this purpose it may have trunnions 43, located in sockets in said ears. These trunnions are alined with the median longitudinal portion of the cross plate, and their axis is shown as parallel to and in the vertical plane of the axis of the pintle 31, although this is not essential. When the spider is tilted and the spring angle-plate attached thereto compresses the springs, the cross plate tilts on its trunnions, a certain amount of loose play between the bolt 40 and the web or flange 38 being permitted by the size of the aperture therein through which the bolt passes, as shown in Fig. 4. The tubular nut 41 has a contracted inner internally-threaded end, and its outer end is swaged in approximately semi-spherical form as at 44. A cross pin 45 is passed through transverse holes in the outer or head portion of the nut, to form a handle by which it may be easily rotated. In forming the nut, a rolled or drawn tube, or a short length of waste tubing, is easily given the form shown by proper dies, and the inner end is tapped. An ordinary carriage bolt, as represented, may be employed.

The head is affixed upon the upper end of a tubular screw spindle 46, and, for the purpose of affording a rigid connection, there is secured between the upstanding arms 29 of the head a transverse reinforcing plate 47 spaced above and parallel to the body portion 28 of said head, and having downturned ends 48 secured to the arms 29 by rivets 49. Any other expedient for reinforcing the head, such as a metal block, could be employed in lieu of the plate 47. The screw spindle 46 is formed of a flat plate having its lower end corrugated at an angle to provide the threads 50 when rolled into tubular form. This tube, thus formed, has near its upper end a bead to engage the under side of the head when the tube is passed through the aperture therein. The extremity of the tube, which passes through an aperture in the reinforcing plate 47, is spun or flared over as at 51 to bind the tube rigidly to the head, the bead and the flare clamping the plates 28 and 47 rigidly between them. The spindle is formed in its upper portion with a longitudinal slot 52, the length of which determines the extent of vertical adjustment of the spindle and chair seat.

The screw spindle passes through an elongated sleeve 53 which is supported by the base hub, and its explanation will be deferred until the construction of the hub has been described. This hub is best shown on Sheet 4 of the drawings. It consists of a central tube 54, the upper end of which has a circumferential bead 55. A centrally-apertured circular plate 56, having a downturned peripheral flange 57, is slipped on the end of the tube to rest on the bead, and the extremity of the tube is spun or flared outwardly as at 58 to lock the plate in place. A lower plate 59 is, when the chair legs have been inserted in place, slipped on the end of the tube, and it has an annular drawn metal flange 60 to provide an elongated bearing surface for engagement with the tube. This bottom plate has equally-spaced radiating arms 61 equal in number to the chair legs, and provided with screw-receiving apertures 62 at the ends thereof. Between these arms, the plate has an upturned interrupted marginal flange 63 of the same diameter as the marginal flange of the top plate. The bottom plate has additional screw-receiving apertures 64 radially alined with those at 61. Spaced about the central tube there are channel bars each having a back 65 and side flanges or webs 66, 66, which are bent to form a dove-tail socket. The side flanges converge from bottom to top, so that the dove-tail wedge-shape ends of the chair legs 67 may be driven into place lengthwise of the side flanges into the channel bars. The upper ends of the channel bars are permanently secured to the top plate 56, by providing the ends of the side webs thereof with lugs or tenons 68 which are inserted in complemental apertures in said plate and then upset or headed. Thus, at their upper ends, the webs are prevented from springing apart. The lower ends of the backs of the channel bars have median depending lugs or tenons 69 which project

downwardly through apertures or sockets in the bottom plate, and are preferably left unheaded so that the bottom plate is not permanently secured thereto, but may be removed at will. In inserting the inner ends of the chair legs in the channel bars, the side flanges of each bar may spring apart somewhat, as the legs are wedged into place, each leg being firmly held by a single channel bar. The bottom plate is then put in place, and screws are driven through the apertures 64 of the bottom plate and the apertures 62 of the radial arms thereof, into the under sides of the legs, with the result that the legs are firmly secured against any lateral swinging movement at their free ends. The legs and the bottom plate are maintained in position by the frictional engagement of the resilent side webs of the channel bars, and by the frictional engagement of the tenons 69 with the walls of their sockets, and of the flange 60 with the lower end of the central tube or core 54. If desired, however, woodscrews may be inserted through apertures 70 in the top plate and driven into the inner ends of the chair legs to secure them together.

To fill the angles between the legs, ornamental spacers 71 made of wood or metal may be employed, in which case they are held in place by the overlapping engagement therewith of the marginal flanges 57 and 63 of the top and bottom plates of the hub, said spacers equaling in length the distance between said plates when the latter are in operative position. Such fillers, while ornamental, are unnecessary, for if desired they may be omitted, as shown in Fig. 17 (Sheet 2). In this case, the backs of the channel bars are concave so as to fit the central tube and the corners of the angle bars are substantially contiguous. Preferably the channel bars are made of heavy stock to afford the desired firmness and strength.

The nut 53 consists preferably of a sheet of metal, bent into tubular form and having in its lower portion two pairs of longitudinal slots 72, 72, 73, 73. The metal between each pair of slots is bent inwardly and corrugated to form interrupted screw threads complemental to those of the screw spindle 46. This tube or sleeve thus formed is rotatably mounted in the central tube or core of the hub and projects above and below the same. At its lower end, one or more tongues 74 are formed therein, which, when the nut is in place, may be sprung outwardly by a suitable tool, so that the ends thereof will engage the end of the said core and act as a stop to prevent accidental dislodgment of the nut from the hub. If desired, however, the tongue may be bent back flush with the tubular nut, to permit it to be drawn out of the hub. Near its upper end, the sleeve has a double bead 75, 76. A centrally apertured lock carrier plate 77 is secured against the bead 76 by spinning or flaring the end of the sleeve as at 78, so that the two elements are rigidly united. The lower bead 75 rests upon washers 79, 80, which in turn rest upon and are supported by the end of the central core 54 of the hub. The lower washer 80 is preferably formed of vulcanite or hard fiber, which, if desired, may be coated with graphite to reduce the friction. The lock carrier 77 has pivoted to its under face by a stud 81 a hooked latch 82, the hook 83 of which projects through a hole in the nut sleeve 53 so as to enter the coöperating slot 52 of the screw spindle, and lock the two parts against relative rotation. The opposite end of the latch extends beyond the circumference of the circular carrier plate 77 to permit its easy manipulation. A stationary approximately parallel arm 84 is riveted at its inner end to the under side of said plate and projects outwardly beyond it, so as to furnish a relatively stationary member with which the fingers of the operator's hand may be engaged when the thumb is pressed against the handle of the latch, and permit the operator easily, by squeezing action of his hand, to open the latch and free the spindle from the nut sleeve. The latch is under the tension of a closing spring 85, of which one end is hooked to the hooked end of the latch and the other is hooked to the stationary member 84. The carrier plate is preferably provided with a depending marginal flange or apron just above the top plate of the hub, and which has apertures for the emergence of the latch handle and the member 84, but which otherwise encircles and conceals the lock, the spring 85 and the washers, and gives a finished appearance to the structure.

In the structure selected as illustrating an embodiment of the invention, there are three concentric tubes of ductile metal, of which the outer constitutes the core of the hub, the inner constitutes the screw spindle, and the intermediate constitutes the nut. The intermediate member or tube is journaled in the outer tube, and, as the threads are preferably intermediate the ends thereof, they are concealed within and between the ends of the hub, and there are cylindrical bearing surfaces above and below the thread portion for engaging the encircling portions of the outer tube. Preferably, though not necessarily, the hub tube or core is drawn seamless tubing, and it prevents any expansion of the nut sleeve which is formed of sheet metal. The outer tube and the nut sleeve have, as stated, coöperating end thrust bearings, by which the weight of the chair seat, the head and the screw spindle is supported directly upon the upper end of the tube or core of the hub.

Having thus explained the nature of my

said invention and described a way of making and using the same, although without attempting to set forth all of the forms in which it may be made or all of the modes of its use, what I claim is:

1. A chair base comprising a top plate, a bottom plate, a plurality of channel bars spaced about a common center, each formed of yielding material and having a back and side flanges for gripping the end of a chair leg between them independently of the other channel bars, and means for connecting said plates with the ends of said channel bars.

2. A chair base hub comprising a plurality of channel bars formed of sheet metal and grouped about a common center, each channel bar forming a dove-tail socket to receive a chair leg therein, a top plate and a bottom plate disposed at the extremities of said channel bars and adapted to engage the upper and under sides of the chair legs inserted in said sockets, and means for connecting said channel bars and said top and bottom plates.

3. A chair base hub comprising a plurality of separate channel bars grouped about a common center, and each adapted to receive the end of a chair leg between the side flanges thereof, a top plate disposed across the upper ends of said channel bars, a bottom plate disposed beneath the lower ends of said channel bars and adapted to receive the ends of the chair legs between them, and means for connecting the ends of said channel bars with the top and bottom plates respectively.

4. A chair base hub comprising a plurality of separate channel bars grouped about a common center, and each adapted to receive the end of a chair leg between the side flanges thereof, a top plate disposed across the upper ends of said channel bars, a bottom plate disposed beneath the lower ends of said channel bars and adapted to receive the ends of the chair legs between them, and means for connecting the ends of said channel bars with the top and bottom plates respectively, said bottom plate being provided with radial arms adapted to underlie and to be secured by fastenings to said chair legs.

5. A chair base hub comprising a plurality of separate channel bars grouped about a common center, and each adapted to receive the end of a chair leg, a top plate disposed across the upper ends of said channel bars, a bottom plate disposed beneath the lower ends of said channel bars and adapted to receive the ends of the chair legs between them, tenons projecting from the upper ends of the side flanges of said channel bars through apertures in the top plate, and tenons projecting downwardly from the backs of said channel bars through sockets in said bottom plate.

6. A chair base hub comprising a plurality of separate channel bars grouped about a common center, and each adapted to receive the end of a chair leg, a top plate disposed across the upper ends of said channel bars, a bottom plate disposed beneath the lower ends of said channel bars and adapted to receive the ends of the chair legs between them, tenons projecting from the upper ends of the side flanges of said channel bars through apertures in the top plate and upset to connect permanently the top plate and said channel bars together, tenons projecting downwardly from the backs of said channel bars through sockets in the bottom plate, said plates having apertures through which fastenings may be passed into the chair legs to secure said legs, bottom plate and top plate separably together.

7. A chair base hub comprising a plurality of separate channel bars grouped about a common center. and each adapted to receive the end of a chair leg, a top plate disposed across the upper ends of said channel bars, a bottom plate disposed beneath the lower ends of said channel bars and adapted to receive the ends of the chair legs between them, and means for connecting the ends of said channel bars with the top and bottom plates respectively, said plates having marginal flanges extending toward each other to overlap, encircle and retain in place filler pieces.

8. The combination with a base hub provided with a central core or tube, a plurality of channel bars grouped around said core and each adapted to receive the end of a chair leg, and top and bottom plates on said tube or core and engaged with the ends of said channel bars, of a tubular sleeve supported upon the upper end of said core and having a threaded portion between the ends thereof, said sleeve being provided with means for engaging the lower end of said tube or core.

9. The combination with a centrally apertured chair base hub, of a sheet metal sleeve journaled in the bore of said hub and supported upon the upper end thereof, said sleeve consisting of a tube having a threaded portion located between the ends of said hub, and a tubular screw spindle within said sleeve formed of sheet metal and provided with threads in engagement with the threads of said sleeve.

10. In combination, three concentric telescoped tubes, channel irons grouped about the outer tube, top and bottom plates engaging the ends of said channel irons and encircling the ends of the said tube, the inner tube being formed with a threaded portion and constituting a screw spindle, and the intermediate tube having a threaded portion between its ends for engagement with the threaded portion of the spindle,

and having its upper end provided with means for resting upon, so as to be supported by, the outer tube.

11. In combination, three concentric telescoped tubes, channel irons grouped about the outer tube, top and bottom plates engaging the ends of said channel irons and encircling the ends of the said tube, the inner tube being formed with a threaded portion and constituting a screw spindle, and the intermediate tube having a threaded portion between its ends for engagement with the threaded portion of the spindle, and having a head at its upper end and one or more washers located between said head and the upper end of said outer tube, whereby said intermediate tube is journaled in and supported by said outer tube.

12. The combination with a chair base hub having a central seamless sheet metal tube or core and spaced channel bars grouped thereabout, top and bottom plates encircling the ends of said tube and engaged therewith, a nut sleeve journaled in said hub and projecting above and below the same and supported upon the upper end of said central tube or core, said sleeve at its lower end having a retaining member for engaging the lower end of said hub.

13. The combination with a chair base hub having a central tube or core, a nut sleeve journaled in said hub and projecting above and below the same and supported by the upper end of said central tube or core, said sleeve at its lower end having an attached retaining tongue punched therefrom and adapted to engage the lower end of said hub.

14. A chair iron comprising a hub, a sheet metal tube journaled in said hub and having a threaded portion, to constitute a nut, said tube and hub having coöperating end thrust bearings, and a sheet metal tube within said sleeve and having a threaded portion in coacting engagement with the threaded portion of the sleeve, said last-mentioned tube constituting a head-supporting screw spindle.

15. A chair iron comprising a hub, a sleeve journaled therein and supported thereby and provided with a threaded portion, a tubular screw spindle in said sleeve provided with a slot and having a threaded portion for engagement with the threaded portion of such sleeve, a sheet metal lock carrier affixed to the upper end of the sleeve beyond the end of the hub, and a manually operated lock on said carrier for operative engagement in the slot in said spindle.

16. A screw spindle for chairs consisting of a tube of sheet metal provided at its lower portion with corrugations constituting a threaded portion, and having its upper portion cylindrical.

17. A screw spindle for chairs consisting of a tube of sheet metal bent into cylindrical form and provided with corrugations constituting a threaded portion, and the side edges of said sheet metal being cut away and forming a longitudinal slot in said spindle.

18. A screw spindle and a coacting nut for chairs, the nut consisting of a sheet metal tube having a portion formed with threads, and the spindle consisting of a sheet metal tube corrugated to provide threads which are engaged with those of the nut, said spindle and nut having unthreaded cylindrical portions in surface engagement.

19. The combination with a slotted tubular screw spindle, of a sleeve thereon having a threaded portion engaging the threaded portion of the spindle and having a bead adjacent the upper end thereof, a sheet metal plate affixed to the upper end of the sleeve against said bead and a spring-tensioned latch pivoted on the under side of said plate and having a lateral hook to engage the slot in the spindle, said latch having a handle portion extending beyond the plate for the manipulation thereof.

20. The combination with a slotted tubular screw spindle, of a sleeve thereon having a threaded portion engaging the threaded portion of the spindle, a plate affixed to the upper end of the sleeve and having a downturned marginal flange, a spring-tensioned latch pivoted to the under side of said plate and having at its inner end a hook to engage the slot in the spindle, said latch having a handle portion extending through a recess in said flange beyond the plate for its manipulation, and a fixed arm attached to and extending beyond the plate in proximity to said handle portion.

In testimony whereof I have affixed my signature.

DAVID R. COLLIER.