

Sept. 3, 1957

J. H. WILSON

2,805,034

SELF-LEVELLING SUPPORTING BASE

Filed June 29, 1953

3 Sheets-Sheet 1

Fig. 1

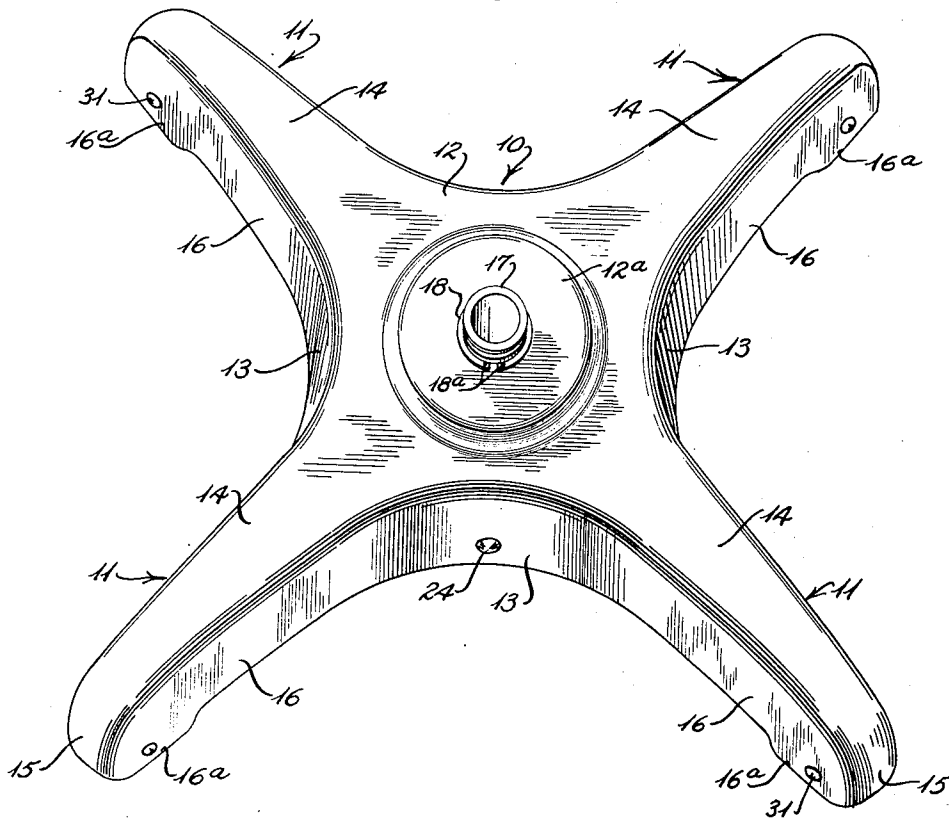
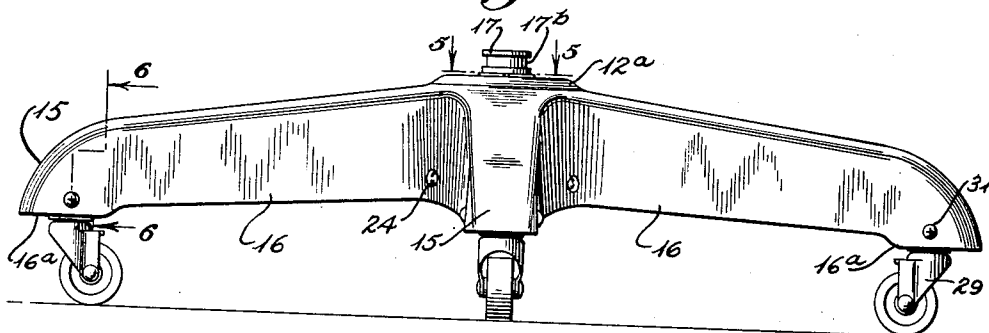


Fig. 2



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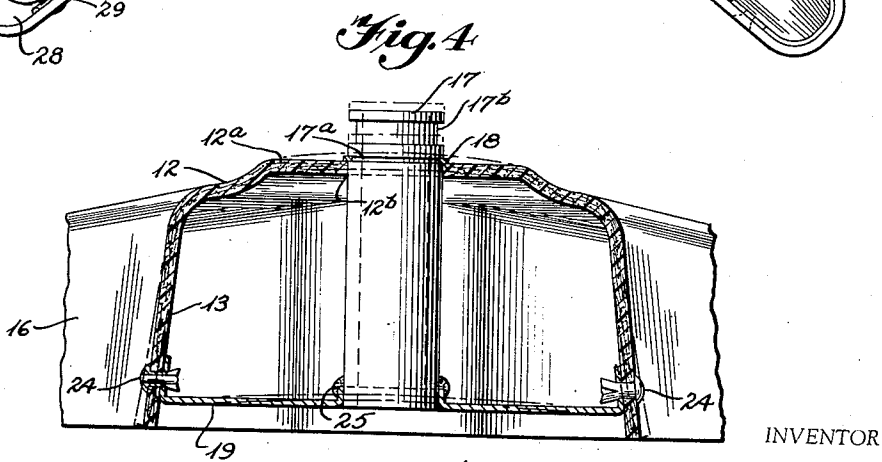
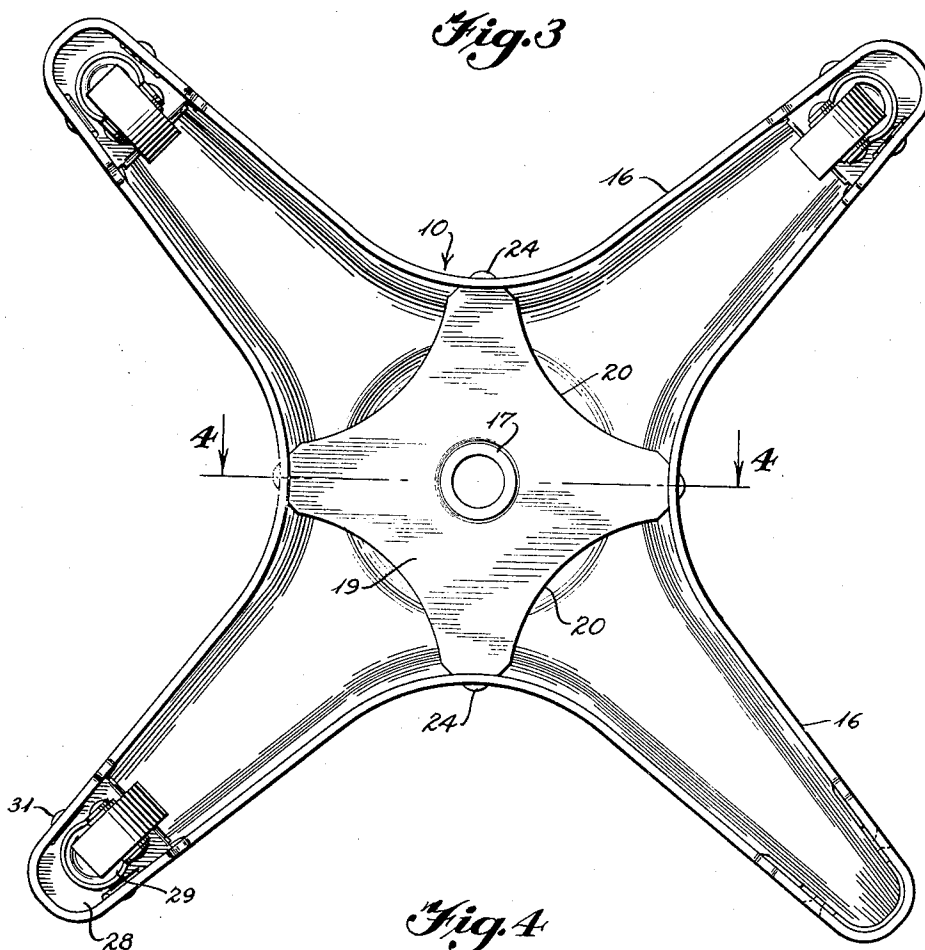
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Fig. 5

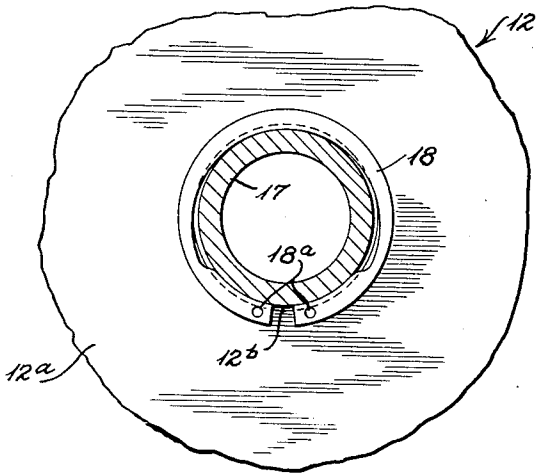


Fig. 6

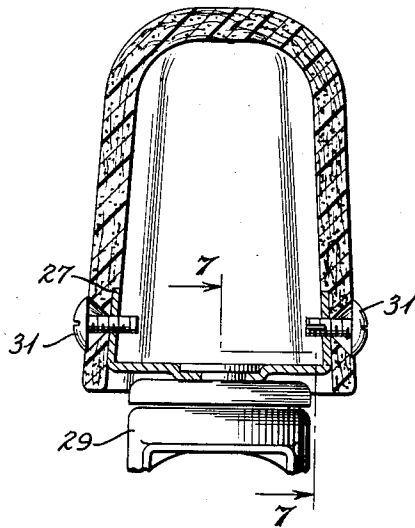


Fig. 7

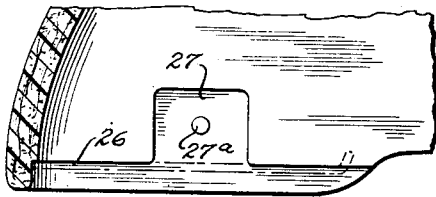


Fig. 9

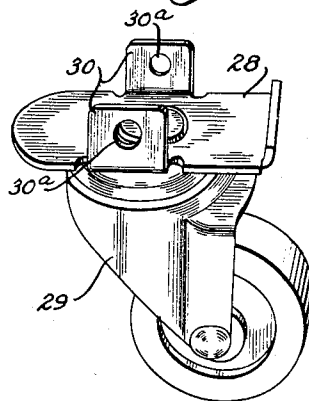
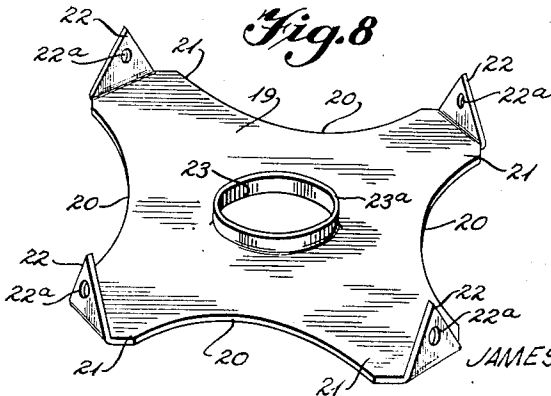


Fig. 8



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SELF-LEVELLING SUPPORTING BASE

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Application June 29, 1953, Serial No. 364,823

5 Claims. (Cl. 248—194)

This invention relates to a self-levelling base for supporting various articles; such as, for example, pedestal fans, swivel chairs, stools, and the like.

It has been common, in recent years, to produce bases of spider-like form having hollow legs radiating from a hollow central hub. These bases have ordinarily been formed from sheet metal or similar materials possessing great strength and rigidity and it has also been common to reinforce such bases. While such bases have provided the advantages of being durable and relatively light in weight, they have the disadvantage of being uneconomical. The greatest disadvantage of these bases has been that they are so rigid they will not adjust to compensate for unlevelness of a supporting surface such as a floor and hence are unstable to such an extent that the supporting base will rock. The materials employed in manufacturing these bases are expensive. In addition to this expense, the cost of dies or other forming tools required to produce these bases, as well as the maintenance expense of such equipment is great. Prior to this invention it was impossible to reduce the cost of bases of the foregoing type by employing less expensive materials having lower strength because the structure of these bases would not permit this substitution. In all previous attempts to reduce the cost of such bases by employing inexpensive materials the savings effected were offset by the necessity for using many reinforcing elements in the construction of these bases.

It is the principal object of this invention to provide a supporting base which is strong, attractive in appearance, and economical to produce. Another object of this invention is to provide a hollow supporting base of spider-like shape which is formed of an inexpensive lightweight flexible material, but which possesses great strength, flexibility and durability. Still another object of this invention is to provide a supporting base of a hollow spider-like shape which is formed of a synthetic resinous flexible sheet and is provided with a novel reinforcing member which counteracts the load applied to the base and distributes it uniformly throughout the base. It is also an important feature of this invention to provide a hollow base having a novel reinforcing member to produce a highly flexible supporting base which is self-levelling and self-adjustable to compensate for unlevelness of the supporting surface upon which the base rests. A further object of this invention is to provide a spider-shaped hollow supporting base formed of a thin flexible sheet material which cooperates with a reinforcing member to counteract and redistribute loads applied to the base and which is further provided with novel caster supporting plates that permit the flexible sheet material and the reinforcing member to cooperate.

Other objects and advantages will appear from the following description of the preferred embodiment of the invention and the accompanying drawings wherein:

Figure 1 is a perspective view from the upperside of a swivel chair base which embodies the features of this invention;

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Figure 2 is a side elevation of the base shown in Figure 1;

Figure 3 is a bottom plan view of the base with one of the casters and the supporting member therefor omitted to show structural details;

Figure 4 is an enlarged fragmentary view in vertical section on line 4—4 of Figure 3;

Figure 5 is an enlarged fragmentary plan view in section on lines 5—5 of Figure 2;

Figure 6 is an enlarged transverse section of one of the legs of the base on line 6—6 of Figure 2;

Figure 7 is an enlarged fragmentary side elevation in section on line 7—7 of Figure 6;

Figure 8 is an enlarged perspective view from above of the reinforcing member of the base; and

Figure 9 is an enlarged perspective view from above of one caster for the base and the caster supporting member.

Referring to the drawings the preferred embodiment of this invention is shown in the construction of a caster supported base for a swivel chair. The base illustrated in Figures 1 to 3, inclusive, consists of a body member comprising a central hub portion 10 and a plurality of spaced legs 11 which extend radially from the central portion 10 and are formed integrally therewith. The central portion or hub 10 is hollow or chambered and includes a top wall 12 and side walls 13 formed integrally therewith. The side walls 13 extend downwardly from the top wall 12; and, preferably, are flared outwardly slightly. The base which is illustrated is provided with four spaced legs or radially extending arms 11 though, obviously, three or more such legs may be employed, as desired. The legs 11 are hollow and are of an inverted channel- or approximately U-shape. Each of the legs 11 includes a top wall 14, an outer downwardly extending end wall 15 and downwardly extending side walls 16. The end wall 15 and the side walls 16, in each leg, are formed integrally with the top wall thereof, and the side walls 16 are, preferably, flared outwardly slightly in the same manner that the side wall 13 of the hub 10 is flared. The side walls 16 are each provided, preferably, with downwardly extending projecting portions 16a, adjacent the outermost ends thereof. The top walls 14 of each leg 11 are formed integrally with the central portion or hub 10 and merge with the top wall 12 of the hub. In a similar manner, the side walls 16 merge with the side walls 13 of the hub 10 and are formed integrally therewith. The end walls 15 of each leg are arcuate in shape as shown in Figure 2. The top wall 12 of the hub 10 may be provided with a raised portion or island 12a which is further provided with a centrally located opening 12b. The body member of the base described and shown, therefore, consists of a completely hollow member of spider-like form which is attractive in appearance.

The hub 10 has a hollow sleeve 17 positioned vertically in and extending upwardly through the opening 12b. The sleeve 17 has a narrow annular recess 17a formed in the outer side wall thereof adjacent the uppermost end of the sleeve and a relatively wider annular recess 17b adjacent but spaced above the recess 17a. The annular recess 17a is adapted to receive a snap ring lock 18. The snap ring 18 consists of a circular split ring which is flat and formed of a spring steel or other strong highly resilient material. The ring 18 is provided with openings 18a in ends of the ring adjacent the split formed therein which are adapted to receive a tool, which is not shown, for applying and removing the ring from the spindle 17. The dimensions of the snap ring 18 are such that, when it is in its normal position, the inner edge of the major portion of the ring is positioned within the annular recess

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17a and the outer or peripheral edge of the ring 18 extends over and rests upon the top wall 12 of the hub 10. The sleeve 17 is, therefore, relatively movable in the opening 12a with respect to the top wall 12 of the hub, but the snap ring lock 18 limits the downward movement of the sleeve 17 in the opening 12a. The inner edge of the ring 18 is slightly recessed as shown in Figure 5 to increase the spring action of this member.

The base is provided with a reinforcing member which is an important feature of this invention. This reinforcing member consists of a star plate 19 formed of spring steel or other highly resilient material. The plate 19 is provided with a plurality of inwardly curved edges 20 which cooperate to provide projecting members or arms 21. Each of the arms 21 is bent upwardly at the outermost end thereof to provide the flange portions 22. The flanges 22 are each provided with openings 22a which must be spaced above the horizontal plane of the plate 19. The plate 19 is also provided with an opening 23 at the center thereof which has approximately the same shape and dimensions as those of the periphery of the sleeve 17 in order that the sleeve may extend into the opening. The edges of the opening may be flanged upwardly, if desired, to provide a wall 23a which will rest upon the outer side wall of the sleeve 17.

The reinforcing plate 19 is positioned horizontally in the central portion or hub 10 adjacent the lowermost edges of the side walls 13 of the hub. The plate 19 is also positioned with each projection 21 extending laterally toward the mid-point of the adjacent side wall 13 of the hub 10 to permit a flange portion 22 to rest upon the inner face of each side wall 13. The side walls 13 are each provided, at the mid-point thereof, with openings which register with the opening 22a in the flange 22 resting upon the inner face of the side wall 13. A rivet 24 is employed in each of the openings at the mid-points of the side walls and the openings 22a aligned therewith to secure the flange portions 22, only, of the reinforcing plate 19 to the hub 10. The sleeve 17 extends downwardly past the flanged edge 23a of the opening 23 in the plate 19 and the lowermost end of the sleeve is secured to the plate 19 by tack welds 25 or other suitable means. The hollow sleeve 17 is adapted to receive in the upper end thereof, the center post of a swivel chair or a supporting member of any other article; such as, for example, a stool, a pedestal fan, or the like. If desired, the annular recess 17b may be employed to receive and support an element of such an article.

The spider-shaped base, the sleeve 17 mounted therein, and the reinforcing plate 19 cooperate in a unique manner to counteract or offset the loads applied to the uppermost end of the sleeve 17 and transmitted there-through to the base member. Such loads are, by this invention, uniformly distributed throughout the spider-shaped base with the result that lighter weight, thinner, and less expensive materials may be used in forming the hollow spider-shaped base. It has been discovered that, when a load is applied to the uppermost end of the sleeve 17, the side walls 13 of the hub 10 and the side walls 16 of the radially extending legs 11 move or spread laterally outwardly. This movement is greatest at the mid-points of the side walls 13 and is illustrated in dotted lines in Figure 4 of the drawings. The flange portions 22 of the plate 19, being secured to the side walls 13, are also subjected to the laterally outwardly directed forces causing the corresponding movement of the side walls 13. When such a force is exerted on the flange portions 22 at a point spaced above the horizontal plane of the plate 19, a reaction is produced in the reinforcing plate which causes it to buckle upwardly as is shown in dotted lines in Figure 4. This upward movement of the plate 19, in turn, transmitted to the sleeve 17 which is secured to the reinforcing plate 19. The maximum movement produced in the plate 19 takes place at the point where the sleeve 17 and the plates are secured together. The sleeve

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17 is thus urged upwardly in a direction coinciding with the line of the forces or load applied to the sleeve but in opposition to such loading. The cooperation between the base and the reinforcing plate 19 is produced only when the plate is provided with upwardly extending flange members 22 and when the latter members are secured to the inner or outer faces of the side walls 13 at points on the flanges above the normal horizontal plane of the reinforcing plate 19. It is also desirable, though not essential, to provide for relative movement between the upper end of the sleeve 17 and the top wall 12 of the hub 10. In the preferred construction shown in the drawings the snap ring or lock 18 transmits the load applied to the sleeve 17 uniformly to the top wall 12; and, thus, the lateral outward movement of the side walls 13 is more uniform.

An additional and very important advantage is derived from the above described cooperation of the hollow base and the reinforcing plate 19. The reinforced hollow bases heretofore available have been so rigid that they have been unable to compensate for unevenness of the supporting surface upon which the base rests. Thus, such bases have been unstable and rock very readily when placed upon a floor or like surface which may be only slightly non-planar. The base comprising this invention, however, is so constructed as to be highly flexible without loss of strength. As the load is distributed by the flexing of the elements of the hollow base, as described above, one or more of the radially extending arms are free to flex upwardly or downwardly to compensate for the lack of levelness of the supporting surface. In tests conducted with the bases comprising this invention the degree of flexibility is such that a three quarter inch block may be placed beneath a single radial arm; and, when a load as small as 100 pounds or as great as 2000 pounds is applied to the base, the base flexes and adjusts for the elevation due to the inserted block. The base supports the load applied thereto without any shift of the load from the line of application thereof. Thus, where the base of this invention is employed to support a chair, a fan or a machine upon a surface which is not level, the base adjusts for this and the supported object remains in its original or vertical position.

The spider-shaped base hereinabove described may, by virtue of this invention, be formed of thin flexible materials which have not, heretofore, been useful in manufacturing articles of this type. Thus, very thin flexible metal sheet may be employed. It is preferred, however, to employ a fiber glass reinforced molded plastic in forming the spider-shaped base. Among the synthetic resinous materials which may be used are alkyd, polyester, polyacrylate, and similar molding resins or compositions thereof. A chair base formed of a polyester resin containing glass fibers wherein the thickness of the walls of the hollow spider-shaped body were between an eighth and three-sixteenths of an inch, when constructed in accordance with this invention, was capable of sustaining loads of 2000 pounds applied in a vertical direction to the uppermost end of the spindle.

A further and important feature of this invention consists of a means for attaching casters to the radially extending legs 11 of the base which permits the hub 10 and the side walls 13 and 16 to coast with the reinforcing plate 19. The depending offset portion 16a at the outermost end of each leg 11 and the arcuate end wall 15 extending therebetween are recessed along the inner faces thereof to provide a supporting shoulder 26. In addition, the inner faces of the side walls 16 above the depending portions 16a are recessed on their inner faces to provide sockets 27. A caster supporting plate 28 having a caster 29 pivotally secured thereto, as shown in Figure 9, is provided with a shape and dimensions which will permit the outer sides and an end thereof to rest upon the shoulder 26. The caster plate 28 is provided with upwardly extending flanges 30 at the outer sides thereof. The flanges 30 are

each provided with threaded openings 30a and the flanges are of a shape such that each may be received in one of the sockets 27 and engage the bottom face and sides thereof as shown in Figure 6. When the flanges 30 are positioned in the respective sockets 27 relative movement between the caster plate 25 and the leg 11 longitudinally of the leg is prevented. The side walls 16 are provided with openings 27a into which machine screws 31 may be inserted and secured to the flanges 30 in the openings 30a therein. The outer end of each radially extending leg 11 is supported by the outer edges and an end edge of the caster plate 30 which edges merely rest upon the shoulder 26. The load carried by each leg 11 is, therefore, uniformly distributed to the edges of the plate 30 engaging the shoulder 26. The caster plate 30 is secured to the leg 11 only by the machine screw 31 or similar means; such as, for example, an expanded plastic rivet, which engages the flanges 30. This permits the side walls 16 to move laterally outwardly as previously described, when a load is applied to the sleeve 17 and cooperation between the several side walls 13 and 16 and the reinforcing plate is not diminished. The depth of the recess; and, hence, the width of the shoulder 26 is such that the edges of the caster plate 30 remain in engagement therewith during any lateral outward movement of the adjacent side walls 16. The caster mounting structure described, therefore, not only affords uniform distribution of the load along the entire extent of the shoulder 26 and the edges of the plate 30 engaged therewith; but, as well, permits lateral outward movement of the side walls 16 when the base is subjected to a load. Alternatively, the legs 11 may each be provided with only the sockets 27 and the recess 26 may be eliminated. In this event the side edges of the caster plate 28 extend laterally outwardly beneath the lowermost edge of the side walls of the leg. The side walls are thus provided with a vertical support and are still free to flex outwardly.

The reinforcing plate 19 has been illustrated and described as a star plate having four radially extending arms 21. It will be apparent that the number of arms 21 provided depends upon the number of side walls 13 of the hub 10 disposed between the radially extending legs 11. If a spider-shaped base is employed having only three radially extending legs 11, the reinforcing plate 19 need only be provided with three radially extending arms 21. In the event the base is provided with a larger number of legs 11, a correspondingly larger number of arms 21 must be provided on the plate 19.

The supporting base comprising this invention has been described, essentially, as a swivel chair base. However, bases constructed in accordance with the principles described herein may be employed as supports for a wide variety of other articles; such as, for example, portable office machines, shop equipment, or like equipment. The spider-shaped body member may be formed by stamping or die pressing operations, in the event thin metal sheet is employed, by standard methods. When this member is produced with synthetic resinous materials it may be molded by known methods or the method disclosed in my copending application Serial Number 360,710, filed June 10, 1952, now Patent No. 2,794,760, may be employed.

I claim:

1. A spider-shaped base comprising a hollow central portion having a top wall and depending side walls, radially extending legs integrally formed with said central portion; said legs being hollow and having top and side walls merging, respectively, with the top and side walls of said central portion; a sleeve supported on the top wall of said central portion and extending downwardly there-through within said central portion; a reinforcing plate positioned within said central portion, means for securing

said plate to said sleeve; said reinforcing plate having spaced laterally projecting arms extending toward the sidewalls of said central portion to a point thereon between said radially extending legs; each of said arms having an upwardly extending flange overlying a face of said central portion side wall adjacent thereto, means for securing a portion, only, of each of said flanges to the side wall of said central portion adjacent thereto at a point on said flange spaced above said reinforcing plate the remaining unconnected portion of each of said flanges being free to move laterally independently of said adjacent side wall; and means for supporting said radially extending legs.

2. A spider-shaped base as set forth in claim 1 wherein said sleeve is relatively movable with respect to the top wall of said central portion, and radially extending means secured to the side of said sleeve, said means extending over and supported by the top wall of said central portion to limit the downward relative movement of said sleeve with respect to said central portion.

3. A spider-shaped base as set forth in claim 1 wherein said sleeve is relatively movable with respect to the top wall of said central portion, said sleeve being provided with an annular recess in the side wall thereof adjacent the upper end thereof, a split spring ring positioned in said recess, said ring being adapted to extend over and be supported by the uppermost face of said top wall.

4. A spider-shaped base as set forth in claim 1 wherein each radially extending leg is provided with at least one recess in each of the inner faces of the walls thereof adjacent the outermost end of said leg, a caster supporting plate, said plate having upwardly extending flange members, each flange being positioned in one of said recesses, means for securing said flanges to said leg, and a caster mounted on said plate.

5. A spider-shaped base comprising a hollow central portion having a top wall and depending side walls, radially extending legs integrally formed with said central portion; said legs being hollow and having top and side walls merging, respectively, with the top and side walls of said central portion; a sleeve supported only on the uppermost surface of the top wall of said central portion and extending downwardly therethrough within said central portion in slidable relation with respect to said top wall; a plate positioned within said central portion, means for securing said plate to said sleeve; said plate having a central body portion and spaced laterally projecting arms extending outwardly beyond said central body portion toward the side walls of said central portion to a point thereon between said radially extending legs; each of said arms having an upwardly extending flange overlying a face of said central side wall portion adjacent thereto, means for securing each of said flanges to the side wall of said central portion adjacent thereto at a point on said flange spaced above said plate the remaining portion of each of said flanges being free to move laterally independently of the side wall portion adjacent thereto; and means for supporting said radially extending legs.

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