United States Patent [19]

Howard et al.

[11] **3,858,271**

[45] **Jan. 7, 1975**

[54] **FLOOR-ENGAGING MOBILE SUPPORT DEVICES FOR ARTICLES OF FURNITURE OR THE LIKE**

[76] Inventors: **Bernard Peter Fox Howard; Ronald David Carter,** both of 19 Church St., Warwick, Warwickshire, England

[22] Filed: **Nov. 20, 1972**

[21] Appl. No.: **307,897**

[30] **Foreign Application Priority Data**

Nov. 19, 1971 Great Britain 53822/71
July 13, 1972 Great Britain 32755/72

[52] **U.S. Cl.** ..... **16/45,** 16/18 CG, 16/42 R, 16/39

[51] **Int. Cl.** **A47b 91/00**

[58] **Field of Search** 16/18, 26, 38, 39, 41, 16/42, 45; 24/204

[56] **References Cited**

UNITED STATES PATENTS

1,012,404	12/1911	Means	16/41
2,169,882	8/1939	Noelting et al.	16/38
2,495,599	1/1950	Pinnick	16/41 X
2,803,865	8/1957	Eljanian et al.	24/204
2,885,718	5/1959	Huff	16/39
3,186,025	6/1965	Kesterton	16/42 R X
3,345,675	10/1967	Haydock	16/45
3,445,882	5/1969	Miano	16/26 X

FOREIGN PATENTS OR APPLICATIONS

691,327	7/1964	Canada	16/18 A
1,576,833	6/1969	France	16/39

Primary Examiner—Paul R. Gilliam
Assistant Examiner—Peter A. Aschenbrenner
Attorney, Agent, or Firm—Markva & Smith

[57] **ABSTRACT**

A furniture castor or glide is disclosed having a pivoted body part designed to mount a castor rolling element and selectively fitted with a plain glide cap or with a cap having an aperture permitting the castor rolling element to project therethrough to provide a floor-engaging rolling surface which constitutes a sole load bearing surface on a hard smooth floor but which embeds into a soft floor surface, such as deep pile carpet, and shares the load-bearing function with a smooth convex undersurface of said cap, the cap and the underside of said body part having complementary abutting load-transmitting surface portions disposed inwards of the periphery of said cap.

11 Claims, 5 Drawing Figures

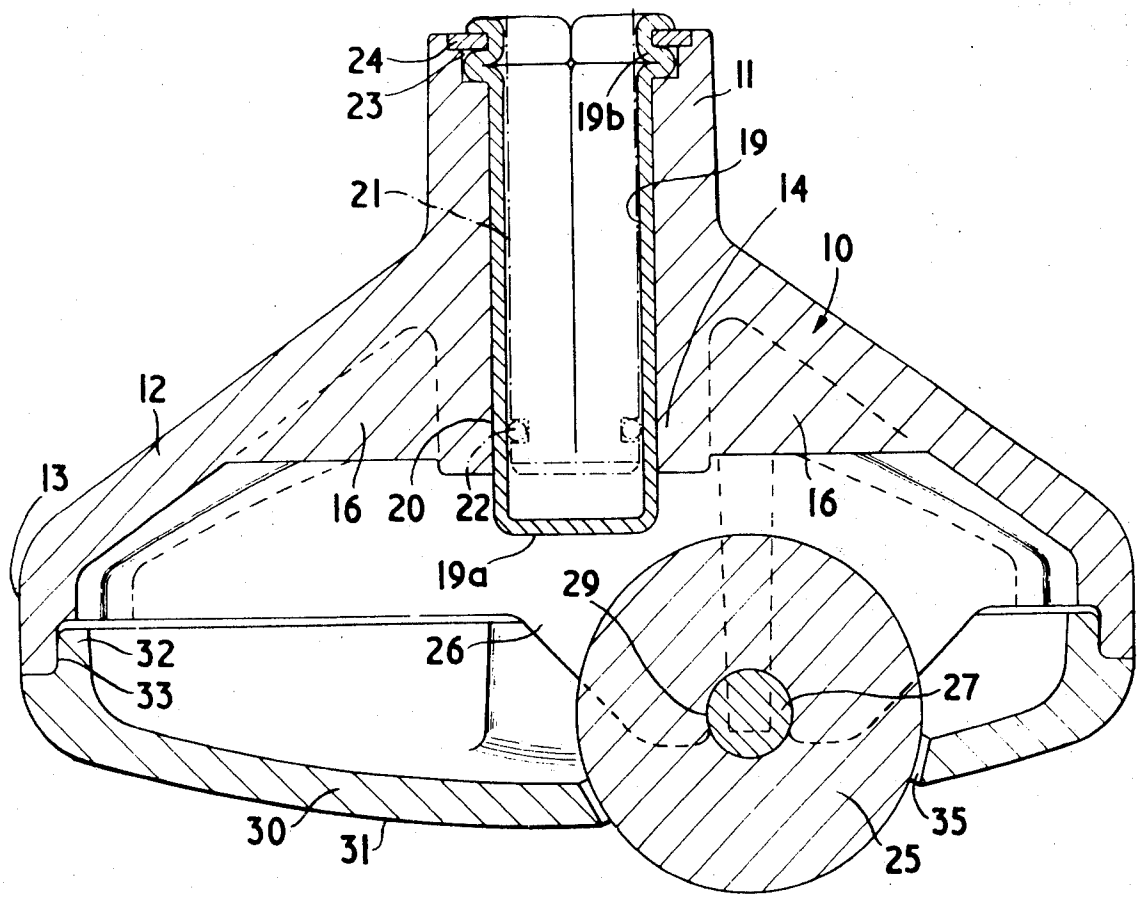


FIG. 5.

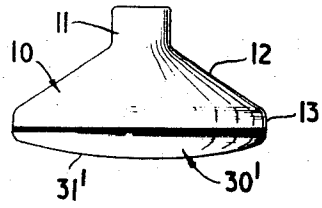


FIG. 1.

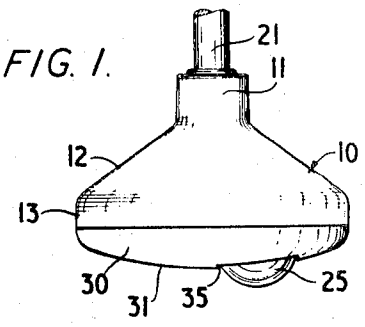


FIG. 2.

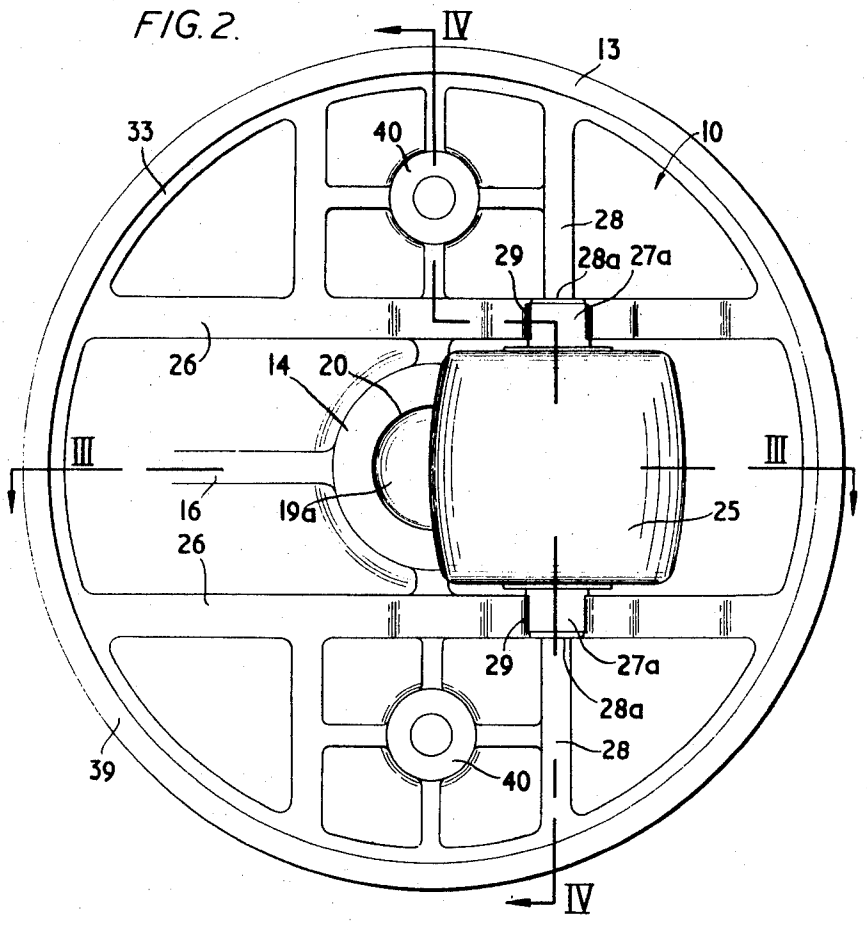


FIG. 3.

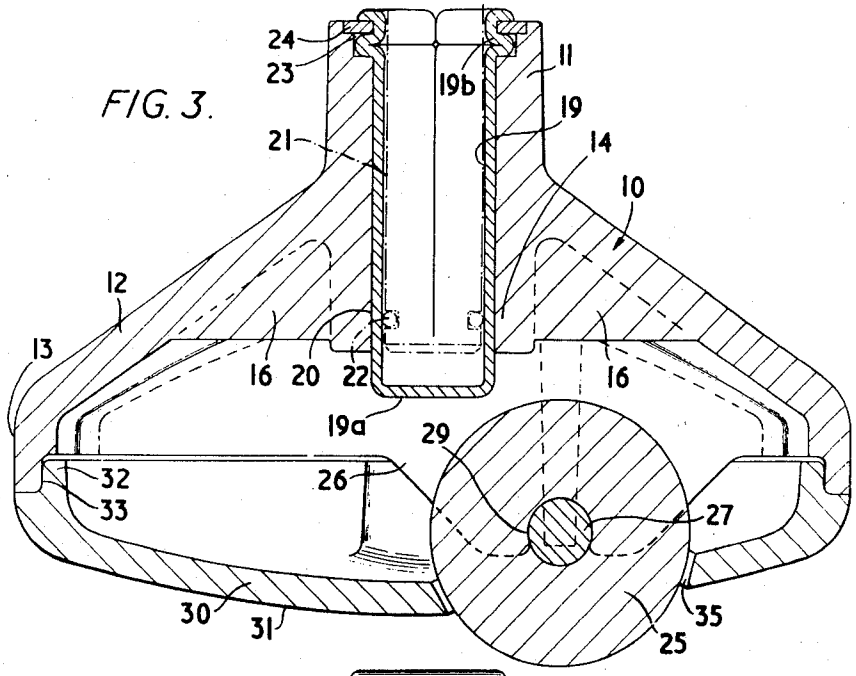
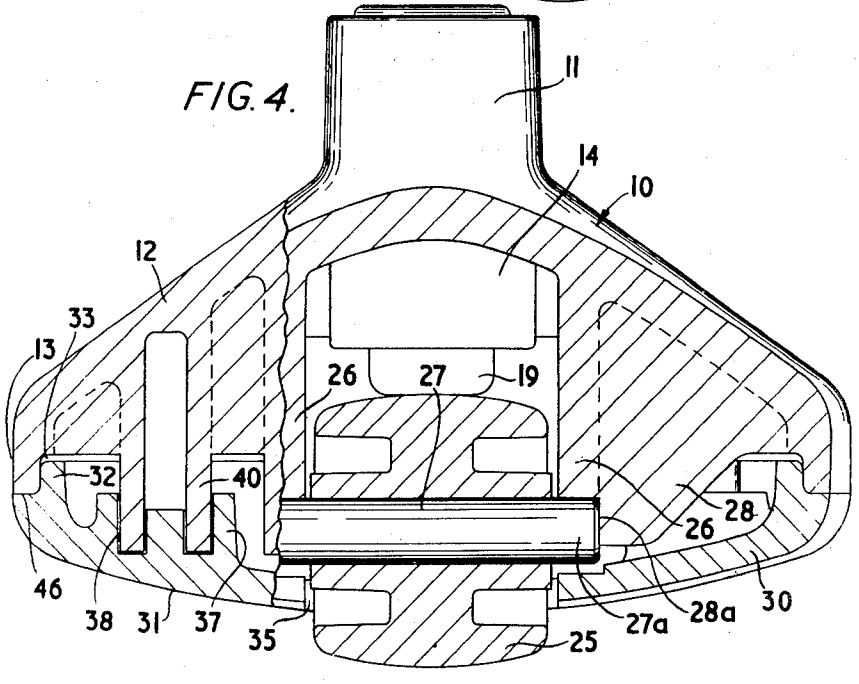

24
23
19b
11
19
21
14
10
12
13
16
20
22
16
19a
29
32
26
33
27
30
31
35
25

FIG. 4.


11
14
10
12
33
13
26
27
19
32
40
28
26
46
38
31
37
35
25
27a
28a
30

FLOOR-ENGAGING MOBILE SUPPORT DEVICES FOR ARTICLES OF FURNITURE OR THE LIKE

BACKGROUND OF THE INVENTION

The present invention relates to floor-engaging mobile support devices, and it especially concerns such devices suitable for articles of furniture and the like which are required to have a satisfactory degree of mobility on various kinds of floor surfaces.

Various forms of wheel or roller type furniture castors are already well-known and function quite satisfactorily on many kinds of floor surfaces. Difficulties, however, arise with some known types when they are used on very soft surfaces, such as deep pile carpets for example, in which they tend to embed to an excessive extent, and for these kinds of surfaces gliders, which have a relatively large load-bearing smooth surface area adapted to slide instead of roll over the surface, are sometimes preferred.

One object of the present invention is to provide an improved construction of floor-engaging mobile support device, for articles of furniture or the like, which can be designed to function as a castor or as a glide.

SUMMARY OF THE INVENTION

Thus, from one aspect, the invention provides a floorengaging mobile support device for articles of furniture or the like, comprising a structure having a body part adapted to be pivotally mounted beneath the article of furniture or the like, or at the lower end of a leg portion thereof, so as to swivel about a vertical axis, a cap fitted to said body part so as to extend over the underside of the latter, said cap having a smooth downwardly-presented convex underside, and a castor rolling element rotatably fitted and housed within an interior cavity of the structure at a position offset from the vertical swivel axis, wherein the underside of the body part provides downwardly-presented surface portions confronting, and disposed in load supporting relationship with, portions of said cap, and wherein the castor rolling element projects through an aperture in said cap sufficiently to provide a floor-engaging rolling surface which, on a hard smooth floor surface, constitutes a sole load bearing surface so that the device functions solely as a castor, but which, on a soft floor surface, such as a deep pile carpet, will embed therein and share the load bearing function with the cap of which the smooth downwardly presented undersurface then forms a load bearing glider surface so that the device acts partially as a glider and partially as a castor.

Also, from another aspect, the invention provides a floor-engaging mobile support device for articles of furniture or the like comprising a structure which includes a body part adapted to be pivotally mounted beneath the article of furniture or the like, or at the lower end of a leg portion thereof, so as to swivel about a vertical axis, said body part having bearing means for use in rotatably fitting a castor rolling element at a position offset from the vertical swivel axis, said body part also being selectively fitted with either a separate plain cap which extends over the undersurface of the body part and which has a smooth downwardly-presented convex surface so as to function as a floor-engaging glider, or with a separate cap which extends over the underside of the body part and which has a smooth downwardly-presented convex surface having an aperture enabling said castor rolling element, when fitted as aforesaid and partially accommodated within an interior cavity of the structure, to project through said aperture sufficiently to provide a floor-engaging rolling surface which, on a hard smooth floor surface, will constitute a sole load bearing surface but which, on a soft floor surface, such as a deep pile carpet, will embed therein and share the load bearing function with the cap of which the smooth downwardly-presented undersurface then forms a load bearing glider surface, the underside of said body part being provided with downwardly-presented surface portions which confront surface portions of the cap with which the body part is selectively fitted so as to be disposed in load-supporting relationship therewith.

Preferably, at least some of the surface portions of the underside of the body part which are in load-supporting relationship with the cap are disposed within a region inwards of the periphery of the cap, and the body part itself is in the form of a substantially hollow hood or dome.

Thus, in profile, the body part, in the form of a hood or dome, may have a relatively small diameter upper cylindrical hub portion of which the exterior surface merges into an outwardly and downwardly flared shell portion terminating in a lower skirt portion having a relatively large diameter cylindrical exterior surface which fits in flush relationship with the cap.

This form of body part readily conceals the castor rolling element, when fitted, from normal view, and the symmetrical configuration about the central swivel axis can provide a pleasing aesthetic appearance and prevents changes in orientation about said swivel axis from being readily apparent to casual observation. It also facilitates design of the device with a smooth exterior profile which is of practical advantage in reducing pick-up of dust and dirt.

The castor rolling element may be a single or double wheel or roller upon an axle mounted in bearing apertures in web or buttress rib portions within and integral with the body part. Again, in a preferred embodiment, a single roller of barrel shape profile is used disposed symmetrically with respect to a vertical plane through the vertical swivel axis, and this roller may be moulded in a hard plastics material either integral with stub axle portions projecting from the ends or with an axial bore adapted to receive a separate bearing spindle.

Most conveniently the body part is formed of a one-piece moulding in a suitable tough plastics material, and the upper portion is provided with socket means to receive the vertical stem of a pivot pin for the swivel mounting of the device on the article of furniture.

The cap may also be moulded in a similar plastics material and may be either permanently or detachably fitted to the body part. Preferably, the smooth downwardly-presented undersurface of the cap is slightly curved or convex over substantially its whole area, symmetrically about the lowest point which III on the central vertical swivel axis.

BRIEF DESCRIPTION OF DRAWINGS

By way of example, the invention will now be more particularly described with reference to the accompanying drawings, wherein:

FIG. 1 is a side elevation of a castor form of floorengaging mobile support device for furniture, in accordance with one embodiment of the invention;

FIG. 2 is an underside plan view, on a larger scale, of the device of FIG. 1 with a component cap portion removed;

FIG. 3 is a vertical section substantially along line III — III of FIG. 2;

FIG. 4 is a vertical section substantially along the line IV — IV of FIG. 2; and

FIG. 5 is a view similar to FIG. 1 but showing the device fitted with a modified, plain form of cap so as to provide an alternative glider structure.

DESCRIPTION OF SPECIFIC EMBODIMENTS

Referring first to FIGS. 1 to 4 of the drawings, the device shown therein comprises a partly hollow dome-shaped body part **10** formed as a one-piece plastics moulding.

Thus, the body part **10** has an upper cylindrical hub portion **11**, an outwardly and downwardly extending substantially conical shell portion **12** and a lower peripheral large diameter skirt portion **13**. Internally, the hub portion **11** continues downwardly for a short distance to provide a central boss portion **14** from which radiate radial reinforcing ribs **16**, integrally connecting said boss portion **14** with the shell portion **12**. The central boss portion **14**, however, is disposed entirely within the upper portion of the body part **10**, well above the skirt portion **13**, so as to leave a substantial hollow space below, centrally in the lower portion of said body part **10**.

For mounting the device on the article of furniture with which it is to be used, the hub portion **11** and boss portion **14** are formed with a central cylindrical bore **20** into which is fitted a metal bearing cup **19** adapted to receive a conventional pivot pin **21** which may be rotatably retained in place, in known manner, by a circlip **22** and which defines a central vertical swivel axis. As shown, the bearing cup **19** has a closed lower end **19*a*** and a flanged upper end **19*b***. The flanged upper end **19*b*** seats within a stepped recess **23** at the top of the hub portion **11** and is peened over a washer **24** located in the latter to provide a satisfactory load-transmitting thrust bearing in engagement with the body part **10**.

The interior of the body part **10** is also provided with further reinforcing ribs including a pair of parallel spaced apart ribs **26**, between which is rotatably mounted a roller **25** constituting a castor rolling element. The roller **25** has a generally barrel-shaped solid configuration with an axial bore which receives a bearing spindle **27** having end portions **27*a***, which rotatably engage in bearing recesses **29**, in said ribs **26**. These bearing recesses **29**, are open at the bottom and have a part circular inner surface extending through an angle slightly greater than 180° so that in effect they are of somewhat inverted U-shaped horseshoe form in section (see FIG. 3). Thus, during assembly, the axle shaft ends **27*a***, are pushed upwards and snapped into position within said recesses **29**, the necessary deformation being accommodated by the resilient yieldability of the plastics material of which the body part **10** is composed. Endwise movement of the bearing spindle or axle shaft **27** is controlled by a pair of short projecting ribs **28**, which extend perpendicular to the ribs **26**, and which are also integral with the body part **10**. These ribs **28**, provide vertical abutment surfaces **28*a***, confronting plain end faces of said spindle or shaft **27**, as illustrated.

Although the roller **25** is located at a position offset from the vertical swivel axis, as is necessary to obtain a desired castoring action, it will be noted (see FIGS. **2** and **3**) that a portion of the roller underlies the short central boss **14** of the body part and in this construction the clearance space provided below said central boss **14** enables the roller **25** to be made of sufficient size to carry the loads anticipated and to be sufficiently close to the vertical swivel axis as to prevent undesirable high moments arising tending to tilt the device about said swivel axis.

Covering the underside of the body part **10** is a cap **30** which is also moulded in a plastics material and which provides a smooth, slightly convex curved under-surface **31**. An aperture **35** in the cap **30** accommodates the lower portion of the roller **25** which projects therethrough to a small extent, in practice not exceeding 3/16 inch, and preferably approximately ⅛ inch, below the central lowest point of the cap, as shown in FIGS. **3** and **4**.

In this embodiment, the rim of the cap **30** has a square cut stepped or rebated formation providing an upstanding annular rib or flange **32** which engages and locates in a substantially square cut rebated annular recess **33** in the cylindrical skirt portion **13** of the body part **10**. There is also an upwardly-presented annular surface **46** around the periphery of the cap which seats against downwardly-presented annular surface **39** of the body part.

Furthermore, the inner surface of the cap **30** also has, located either side of the aperture **35** and lying on a diametric axis, a pair of upstanding bosses **37**, having therein annular recesses **38** within which fit the lower ends of depending tubular bosses **40** integrally moulded into the body part **10** as illustrated.

The cap **30** is conveniently permanently secured to the body part **10** after assembly by means of an adhesive which can be placed in the cup-like annular recesses **38**, so that there is then no possibility of the cap being accidentally released during use. The engagement of the depending bosses **40** of the body part, which it will be noted are also symmetrically disposed either side of the roller along a diametric axis, with the upstanding bosses **37** of the cap **30**, is also of considerable practical importance in supporting the cap over an extensive area inwards of the periphery and in bearing and transmitting loads imposed on the cap if the device functions as a glider as hereinafter described.

In use on a hard floor surface, the roller **25** will provide the sole floor-engaging load-bearing surface and the device functions then in the normal manner of a castor. On sufficiently deep soft floor surfaces, however, such as deep pile carpets, into which the roller **25** embeds the undersurface of the cap **30** will also engage the floor and will then act as a glider bearing a substantial proportion of the load. Mobility of the article of furniture is then provided by a sliding action and the castor effect may be minimal.

Conveniently, all the parts may be moulded in a plastics material such as ABS, or if desired, especially for decorative purposes, the body part may be a metal casting such as a light aluminium alloy.

It will be appreciated that the castor described not only has a pleasing aesthetic appearance and very satisfactory functional characteristics, but it is composed of relatively few parts and manufacturing and assembly problems should be minimal.

Furthermore, if it is desired to produce and market a glide without a castor rolling element, the roller **25** can be omitted and the same body part **10** can be fitted with an alternative or modified plain form of cap identical with cap **30** but without the aperture **35**, to provide a continuous glide surface. This is illustrated in FIG. **5** wherein the plain form of cap, having a smooth downwardly-presented undersurface **31'** of overall convex curvature, is indicated at **30'**.

In both the castor and glider forms, the flush fitting relationship of the cap and body part in relation to their adjacent exterior surfaces, and general form of these components, provides the device with a desirable continuous smooth exterior profile, as is clearly evident from the drawings.

In alternative constructions of the castor form of the device described, the roller **25** could of course be moulded integral with short stub axle shafts projecting axially from opposite ends so that no separate bearing spindle need be used, or it may have a twin-wheel structure.

Also, as previously indicated, the cap may be detachably fitted to the body part by, for example, a snap-fit engagement of interengaging flange and groove formations although care in design is necessary to ensure that such cap is not likely to become inadvertently detached during use.

Furthermore, additional or alternative co-operating supporting portions or surfaces on the body part and/or cap may be provided to give the required internal load-supporting characteristics to said cap, and it will, of course, be understood that many further modifications in the constructional details, hereinbefore described by way of example, could also be made within the scope of the invention, if desired.

We claim:

1. A floor-engaging mobile support device for articles of furniture and the like, said device comprising:

a. a housing including a body portion and a bottom cap portion,

b. means for pivotally mounting the housing so as to swivel about a vertical axis,

c. said bottom cap portion extending over the upperside of the body portion and having an outer structural surface configuration effective to provide a gliding facility,

d. a first load transmitting abutment means located in the body portion and including boss formations extending downwardly and providing supporting surfaces, and

e. second load transmitting abutment means located in the bottom cap portion to be in confronting load bearing contact with said first load transmitting abutment means,

f. said second load transmitting abutment means including means to receive the boss formations,

g. said boss receiving means including confronting surfaces that contact said supporting surfaces,

h. the body and bottom cap portions having inner surface configurations effective to form an interior cavity within said housing.

2. A device as defined in claim **1** wherein

said boss receiving means include upstanding portions forming recesses which engage said boss formations,

said boss formations being a part of a unitary construction forming the body portion,

said bottom cap portion being permanently fixed to the body portion by adhesive disposed within said recesses.

3. A device as defined in claim **1** wherein

said body portion includes a castor rolling element rotatably fitted within the interior cavity at a position offset from the vertical axis,

said bottom cap portion includes an aperture through which the castor rolling element projects.

4. A device as defined in claim **3** wherein

said body portion includes bearing means for rotatably conveying the castor rolling element.

5. A device as defined in claim **3** wherein

the castor rolling element projects by not more than 3/16 inch below the lowest point of the undersurface of the bottom cap portion.

6. A device as defined in claim **3** wherein

the body portion carries a separate bearing spindle which supports the castor rolling element,

said castor rolling element having a generally barrel shaped profile with an axial bore which receives said bearing spindle and being composed of a plastic material,

said body portion integrally formed therewith and including inverted U-shaped bearing apertures which cooperate through snap fit engagement with said bearing spindle to rotatably support said bearing spindle.

7. A device as defined in claim **1** wherein

the outer structural surface configuration of the bottom cap portion has a convex curvature which extends symmetrically about the vertical swivel axis over at least the whole central area of said cap portion,

said body and bottom cap portions including adjacent exterior surfaces which lie in flush fitting relationship to provide the device with a continuous smooth exterior surface profile.

8. A device as defined in claim **1** wherein

said body portion includes a relatively small diameter upper cylindrical hub section, an outwardly and downwardly flared shell section, and a lower skirt section having a relatively large diameter cylindrical exterior surface fitting in flush relationship with the bottom cap portion.

9. A device as defined in claim **8** wherein

the lower skirt section has an annular groove and the bottom cap portion has a complementary upstanding annular rib which engages and locates within said annular groove.

10. A device as defined in claim **8** wherein

the cylindrical hub section has an axial bore and the body portion includes a bearing cup fitted within said axial bore,

said bearing cup being adapted to receive an upstanding pivot pin defining the vertical swivel axis and having a closed lower end and a flanged upper end,

said upper end being seated within a stepped recess at the top of said hub section and being peened over a securing element located in said recess to provide an effective load transmitting thrust bearing.

11. A device as defined in claim **1** wherein

said first and second load transmitting abutment means include supporting surfaces disposed at a location inwardly of the periphery of said bottom cap portion.

* * * * *