

PATENT SPECIFICATION

(11) 1 471 989

1 471 989

- (21) Application No. 34907/74 (22) Filed 8 Aug. 1974
 (23) Complete Specification filed 23 May 1975
 (44) Complete Specification published 27 April 1977
 (51) INT CL² B60B 33/00
 (52) Index at acceptance A4U 21 23A
 (72) Inventor MICHAEL JOSEPH JAMES



(54) IMPROVEMENTS IN OR RELATING TO CASTORS

(71) We, GLOBAL CASTORS AND
 HARDWARE LIMITED, formerly Lakelet
 (General Engineers) Limited, a British
 Company of Plastic Works, King Alfred
 Way, Cheltenham, Gloucestershire, do
 hereby declare the invention, for which we
 pray that a patent may be granted to us, and
 the method by which it is to be performed,
 to be particularly described in and by the
 following statement:—

This invention relates to castors of the
 type which have a wheel rotatably mounted,
 about a bearing axis inclined to the
 horizontal, on a body itself pivotally
 mounted on or about a vertical mounting
 spindle with the wheel axis offset laterally of
 the spindle axis.

The assembly of such castors tends to be
 labour intensive requiring the fitting of
 various fixing devices, such as spring rings
 or the like, which fix the rotatable wheel to
 the body and locate the spindle. The object
 of the invention is to provide a castor
 assembly which is relatively simple to
 assemble and which, in particular, includes
 a lesser number of parts than usual and
 hence can be manufactured comparatively
 cheaply.

According to the invention a castor of the
 type comprised comprises a moulded body
 with an integral bearing boss, a rotatably
 mounted wheel with an integral bearing boss
 having an external peripheral groove, said
 bearing bosses engaging one within the
 other to provide a bearing for the wheel, and
 a mounting spindle located in a bore in the
 body and which engages in said groove to
 locate the wheel axially with respect to the
 body, the body and the spindle having inter-
 engaging formations to provide "snap-in"
 fixing of the spindle in the body.

It is preferred that the body boss should
 act as a stub axle and hence engage within
 the wheel boss, which is hollow for the
 purpose, to provide a bearing journal for
 the wheel. The external periphery of the
 wheel boss may additionally, or alter-
 natively, provide a bearing journal which

runs within a female bearing surface of the
 body. For economy of moulding material
 this female bearing surface may be formed
 in a sleeve-like portion of the body moulding
 concentric with and surrounding the body
 boss. This sleeve-like portion may be thin-
 walled and interconnected with the
 surrounding main body portion by a ring of
 spaced radial strengthening webs.

Preferably the body and the wheel are
 both plastics injection mouldings, and to
 simplify the moulding technique the wheel
 boss may be moulded with a plain periphery
 in which said groove is machined before
 assembly of the castor. In a preferred
 embodiment the assembly includes a
 flanged fixing ferrule in which the spindle is
 rotatably supported, and a snap-in fixing
 similar to that of the spindle in the body may
 be employed between the spindle and the
 ferrule. Thus an assembly results which
 consists only of four functional parts, no
 special fixing components being required.

It is preferred that if provided the fixing
 ferrule, or other fixing member for at-
 tachment to the article to be supported by
 the castor, should turn freely on the spindle
 and transmit the vertical load directly to the
 castor body for which purpose it may
 engage a thrust face surrounding the spindle
 on the body. However, it may be desired to
 fix the spindle itself directly into the sup-
 ported body and to this end the spindle
 preferably also turns freely in the castor
 body. All the parts, other than the spindle,
 are conveniently moulded from a plastics
 material such as nylon. The spindle may be a
 length of steel rod with two spaced
 peripheral grooves for snap-in engagement,
 respectively, with projections in the body
 and the ferrule or other fixing member. The
 inner end of the spindle may engage an
 internal stop face within the body to limit
 the spindle insertion during assembly of the
 castor and/or support the load when spindle
 fixing of the castor is employed.

Said preferred embodiment is illustrated
 in the accompanying drawings and will now

50

55

60

65

70

75

80

85

90

95

14

be described, by way of example, with reference thereto. In the drawings:—

Figure 1 is a sectional view of a right-hand castor assembly, taken in an axial plane of the castor wheel,

Figure 2 is an external view of the assembly in the direction of the arrow II in Figure 1,

Figure 3 is an external view in the direction of the arrow III in Figure 1,

Figure 4 is a sectional view on the line IV—IV in Figure 1, with the wheel omitted, and

Figures 5 and 6 are detail views of a body of the assembly.

The castor illustrated has a dished moulded nylon body 1 on which a domed nylon wheel 2 is rotatably mounted about an axis 3 which, when the castor is fitted and as illustrated, is inclined downwardly away from the body 1 and disposed in a vertical plane. The body 1 is moulded with an internal integral bearing boss acting as a stub axle 4 and which, for material economy, is of hollow tubular form. The wheel 2 has an integral central hollow bearing boss 5, with a cylindrical central bore 6 which runs on the stub axle 4.

For increased bearing strength and rigidity the external periphery 7 of the wheel boss 5 also provides a bearing journal which runs within a female bearing surface 8 of the body 1. This surface 8 is formed in a sleeve-like portion 9 of the body moulding which is concentric with and surrounds the stub shaft 4. The thin-walled portion 9 is interconnected with the surrounding main portion of the body 1 by a ring of spaced radially-disposed strengthening webs 10.

A top mounting spindle 11 is located in a bore 12 of the body 1. When the castor is fitted the spindle 11 is as shown disposed vertically, and to provide the castor action the spindle axis 13 is offset to one side of the aforesaid vertical plane which contains the axis 3. As viewed at right angles to that plane, as can be seen from Figure 1, the axis 13 is substantially aligned with the ground-contact point of the rim 14 of the castor wheel 2. The rim 14 has the usual part-spherical convex ground-engaging surface 15, the offsetting of the axes 3 and 13 resulting in the axis 13 in fact intersecting the ground to one side of said vertical plane a corresponding distance from said ground-contact point.

In addition to defining the vertical pivotal axis 13 of the fitted castor, the spindle 11 locates the wheel 2 axially relatively to the body 1 on the axle 4. To this end the spindle 11 engages an annular groove 16 machined in the outer periphery 7 of the wheel boss 5. The cross-sectional shape of the groove is chosen to allow free wheel rotation and to

suit the diameter of the spindle 11 and the relative skew angle of the axes 3 and 13.

An internal stop face 17 moulded within the body 1 provides positive axial limitation of insertion of the spindle 11 on assembly, the spindle being pushed into the bore 12 after the wheel and body have been fitted together. Retention of the spindle 11 is achieved by a continuous annular projecting lip 18 moulded in the body 1 within the bore 12 where the latter breaks into the hollow central space of the body between the sleeve portion 9 and the stub axle 4. The wall of this hollow space, which space is open on the side adjacent the wheel 2, provides the spindle stop face 17. The lip 18 resiliently engages a peripheral groove 19 in the spindle 11, so that the latter has a snap-in fitting within the body 1 while being freely rotatable therein, and the sleeve-like portion 9 is cut away in line with the bore 12 to allow engagement of the spindle 11 in the groove 16.

The castor assembly illustrated includes a ferrule 20 as the chosen type of fixing member, although it will be appreciated that other forms of fixing member may be employed or the fixing member omitted and the spindle itself fixed. The ferrule 20 has a tubular spigot-fixing portion 21 with a fixing flange 22 having screw-fixing holes 23. The spindle 11 turns freely in a bore 24 in the ferrule, the bore 24 being moulded with internal "pips" 25 which engage a second annular groove 26 in the spindle 11. These pips 25 thus provide snap-in location for the spindle 11 in the ferrule 20 also, and thus the castor has the minimum number of functional parts essential to castor operation without any additional fixing elements being required for either the wheel 2 or the spindle 11.

The vertical weight of the body supported is in use transmitted directly to the body 1 of the castor by the ferrule 20, and not through the spindle 11. The body 1 is accordingly moulded with a flat thrust face 27 surrounding the bore 12, this face being engaged by the lower tubular end 28 of the ferrule 20, which is also a nylon moulding.

As already mentioned, if desired the ferrule 20 or other fixing member can be omitted and the spindle 11 fixed directly into a bore in the article to be supported. When direct spindle fixing in this manner is employed the stop face 17 within the castor body becomes a thrust face which takes the load applied to the spindle. To allow spindle fixing the retained spindle 11 as described turns freely in the bore 12 in the body 1.

The grooves 19 and 26 are symmetrically and identically disposed in the spindle 11, that is they are of the same form and equally spaced from the respective ends of the

65

70

75

80

85

90

95

100

105

110

115

120

125

spindle. Thus the spindle is reversible which materially simplifies mechanical handling and assembly.

WHAT WE CLAIM IS:—

- 5 1. A castor comprising a body adapted to be pivotally mounted about a vertical mounting axis and moulded with an integral bearing boss, a wheel rotatably mounted on the body about bearing axis which is inclined to the horizontal and offset laterally of the pivotal mounting axis of the body, the wheel being formed with an integral bearing boss having an external peripheral groove and said bearing bosses engaging one within 10 the other to provide a bearing for the wheel, and a mounting spindle aligned with said vertical axis and located in a bore in the body with the spindle engaging in said groove to locate the wheel axially with respect to the body, the body and the spindle having interengaging formations to provide "snap-in" fixing of the spindle in the body.
- 25 2. A castor according to claim 1, wherein said body boss acts as a stub axle and engages within the wheel boss, which is hollow for the purpose, to provide a bearing journal for the wheel.
- 30 3. A castor according to claim 1 or claim 2, wherein the external periphery of the wheel boss provides a bearing journal which runs within a female bearing surface of the body.
- 35 4. A castor according to claims 2 and 3, wherein said female bearing surface is formed in a sleeve-like portion of the body moulding, which portion is concentric with and surrounds the body boss.
- 40 5. A castor according to claim 4, wherein said sleeve-like portion is interconnected with the surrounding main body portion by a ring of spaced radial strengthening webs.
- 45 6. A castor according to any one of the preceding claims, wherein the body and the wheel are both plastics injection mouldings.
- 50 7. A castor according to any one of the preceding claims, wherein said groove is machined in a plain moulded periphery of the wheel bearing boss.
8. A castor according to any one of the preceding claims, wherein the body is moulded with a hollow internal space open on the side of the body adjacent the wheel,

the spindle bore has an inner end which terminates at said hollow space, and said interengaging formations comprise a peripheral groove in the spindle and an internal projection moulded at the inner end of the spindle bore and projecting radially into that bore.

9. A castor according to any one of the preceding claims, wherein the spindle is axially located and rotatably supported in a fixing member which turns freely on the spindle.

10. A castor according to claim 9, wherein the spindle also has a "snap-in" fixing in the fixing member.

11. A castor according to claim 9 or claim 10, wherein said fixing member is a flanged ferrule.

12. A castor according to any one of claims 9 to 11, wherein in use the vertical load supported by the castor is transmitted directly to the body which has a thrust face surrounding the spindle and engaged by the fixing member.

13. A castor according to claim 10, wherein the spindle is a length of steel rod and each snap-in fixing is provided by a corresponding peripheral groove in the rod which is engaged by a respective lip or projection in the body or fixing member to provide the fixing.

14. A castor according to claim 13, wherein the grooves are symmetrically disposed in the spindle and the latter is accordingly reversible.

15. A castor according to any one of the preceding claims, wherein the body is moulded with an internal stop face engageable to limit insertion of the spindle into the body during assembly of the castor and/or act as a thrust face to withstand spindle loading.

16. A castor constructed and arranged substantially as herein particularly described with reference to the accompanying drawings.

S. JONES-ROBINSON,
Chartered Patent Agent,
The Laurels,
320, London Road,
Charlton Kings,
Cheltenham,
Gloucestershire.
Agent for the Applicants.



(9)

spindle. Thus the spindle is reversible which materially simplifies mechanical handling and assembly.

WHAT WE CLAIM IS:—

- 5 1. A castor comprising a body adapted to be pivotally mounted about a vertical mounting axis and moulded with an integral bearing boss, a wheel rotatably mounted on the body about bearing axis which is inclined to the horizontal and offset laterally of the pivotal mounting axis of the body, the wheel being formed with an integral bearing boss having an external peripheral groove and said bearing bosses engaging one within the other to provide a bearing for the wheel, and a mounting spindle aligned with said vertical axis and located in a bore in the body with the spindle engaging in said groove to locate the wheel axially with respect to the body, the body and the spindle having interengaging formations to provide "snap-in" fixing of the spindle in the body.
- 25 2. A castor according to claim 1, wherein said body boss acts as a stub axle and engages within the wheel boss, which is hollow for the purpose, to provide a bearing journal for the wheel.
- 30 3. A castor according to claim 1 or claim 2, wherein the external periphery of the wheel boss provides a bearing journal which runs within a female bearing surface of the body.
- 35 4. A castor according to claims 2 and 3, wherein said female bearing surface is formed in a sleeve-like portion of the body moulding, which portion is concentric with and surrounds the body boss.
- 40 5. A castor according to claim 4, wherein said sleeve-like portion is interconnected with the surrounding main body portion by a ring of spaced radial strengthening webs.
- 45 6. A castor according to any one of the preceding claims, wherein the body and the wheel are both plastics injection mouldings.
7. A castor according to any one of the preceding claims, wherein said groove is machined in a plain moulded periphery of the wheel bearing boss.
- 50 8. A castor according to any one of the preceding claims, wherein the body is moulded with a hollow internal space open on the side of the body adjacent the wheel,

the spindle bore has an inner end which terminates at said hollow space, and said interengaging formations comprise a peripheral groove in the spindle and an internal projection moulded at the inner end of the spindle bore and projecting radially into that bore.

9. A castor according to any one of the preceding claims, wherein the spindle is axially located and rotatably supported in a fixing member which turns freely on the spindle.

10. A castor according to claim 9, wherein the spindle also has a "snap-in" fixing in the fixing member.

11. A castor according to claim 9 or claim 10, wherein said fixing member is a flanged ferrule.

12. A castor according to any one of claims 9 to 11, wherein in use the vertical load supported by the castor is transmitted directly to the body which has a thrust face surrounding the spindle and engaged by the fixing member.

13. A castor according to claim 10, wherein the spindle is a length of steel rod and each snap-in fixing is provided by a corresponding peripheral groove in the rod which is engaged by a respective lip or projection in the body or fixing member to provide the fixing.

14. A castor according to claim 13, wherein the grooves are symmetrically disposed in the spindle and the latter is accordingly reversible.

15. A castor according to any one of the preceding claims, wherein the body is moulded with an internal stop face engageable to limit insertion of the spindle into the body during assembly of the castor and/or act as a thrust face to withstand spindle loading.

16. A castor constructed and arranged substantially as herein particularly described with reference to the accompanying drawings.

S. JONES-ROBINSON,
Chartered Patent Agent,
The Laurels,
320, London Road,
Charlton Kings,
Cheltenham,
Gloucestershire.
Agent for the Applicants.