

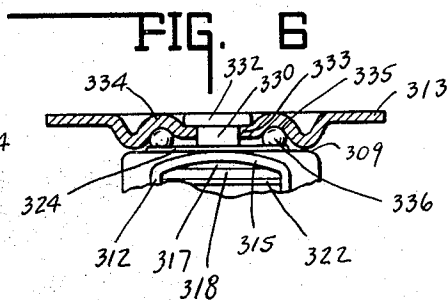
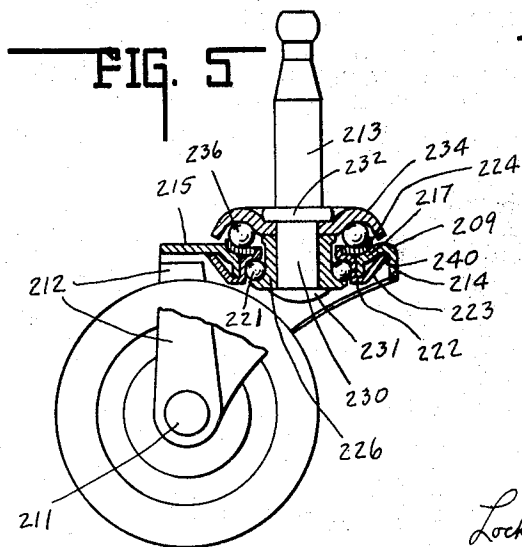
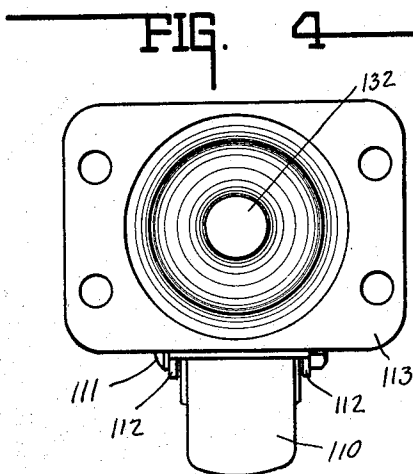
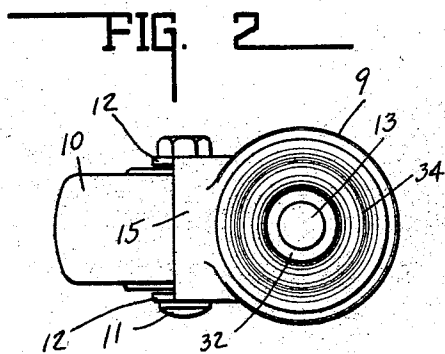
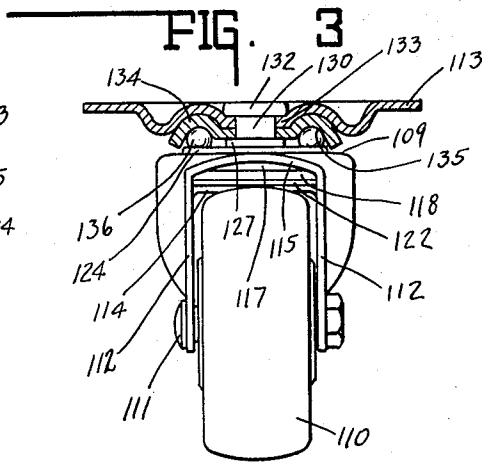
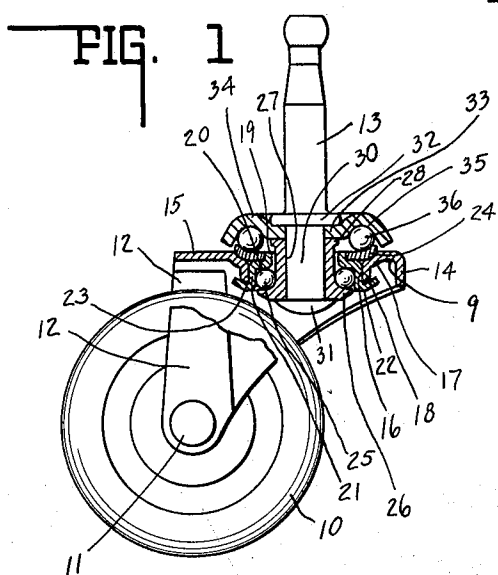
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1,949,448

DOUBLE BALL CASTER

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# UNITED STATES PATENT OFFICE

1,949,448

## DOUBLE BALL CASTER

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7 Claims. (Cl. 16—21)

This invention relates to improvements in an anti-friction caster suitable for office chairs and the like.

The chief object of this invention is to improve the swiveling connection between the load connecting portion and the yoke of a double ball caster construction suitable for the purpose set forth.

Another object of the invention is to provide an improved and strengthened yoke of sheet metal.

The chief feature of the invention consists in the formation of a swiveling portion of the yoke and the associated parts cooperating with a double series of superposed balls.

Another feature of the invention consists in the formation of the yoke from sheet metal, parts thereof being so arranged that a more rigid construction, to wit, that approximating a cast metal yoke, is obtained.

The full nature of the invention will be understood from the accompanying drawing and the following description and claims:—

In the drawing, Fig. 1 is an elevational view, parts being broken away to show other parts in central section and of a stem type form of the invention.

Fig. 2 is a top plan view thereof.

Fig. 3 is an elevational view of a plate caster modification of the invention, parts being shown in central section.

Fig. 4 is a top plan view thereof.

Fig. 5 is a view similar to Fig. 1 and of a modified form of the invention.

Fig. 6 is a view of a form of the invention slightly different from that shown in Fig. 3 and of that part of the invention which is modified.

In Figs. 1 and 2 of the drawing there is illustrated a caster wheel 10 rotatably supported on an axle 11 carried by a pair of parallel ears 12. The axis of rotation of the wheel is offset from the axis of the load engaging stem 13, the latter being the swiveling axis of the caster. The two ears 12 are joined to a horizontal portion 9 which is substantially circular in outline and includes a depending partially circular wall 14 that merges with the ears; the latter conforming thereto. The forward portion of the caster yoke is extended as at 15 and similar to portion 115, as shown particularly in Fig. 3, the portion 15 is arched and the top of the arch is tangent to a plane including the horizontal portion 9 of the yoke.

The horizontal portion of the yoke includes a central opening 16 defined by a downwardly and inwardly inclined countersunk portion 17 ter-

minating in a downwardly directed tubular extension 18.

Nested within the aperture 16 is a sheet metal progressively outwardly and downwardly offset tubular member having the upper axially extending inward tubular extension 19, the horizontal outwardly directed portion 20 and the downwardly directed tubular portion 21. The latter terminates in an outwardly directed portion or flange 22 which is extended outwardly and upwardly as at 23 and portion 22 engages the lower end of the tubular extension 18 of the yoke.

A partially concave hardened metal ring or plate 24 is nested in the groove formed by the downwardly inclined annular portion 17 of the yoke and the horizontal portion 20 of the tubular member and said ring is centered by the upward axial extension 19. The lower and inner surfaces, respectively, of the portions 20 and 21 engage a lower series of balls 25, the latter riding upon the flange 26 of a sleeve 27 having an upper flange 28, the outer dimension of which is just slightly less than the inner diameter of the axial extension 19 of the tubular member. The balls constitute the lateral thrust or swiveling members.

A central retaining member in the form of a pintle or rivet 30 with the enlargement 31 lying beneath the sleeve 27, has an enlargement 32 bearing upon the portion 33 of an upper race forming member 34 which has in its under surface a concave channel 35 adapted to receive an upper series of balls 36, the latter bearing on the race ring 24 and constituting the vertical load sustaining members.

In Figs. 3 and 4, the modified form of the invention includes the rivet portion 130 having the enlargement 132 which bears upon the portion 133. Portion 133 is rigid with the load sustaining portion 113 in the form of a plate. The plate portion is corrugated annularly to nest the ball race forming member 134 having the annular channel 135 which receives the balls 136, the latter bearing upon the annular race forming ring 124 which is concentric with but spaced from the sleeve member 127. Parts in this modification like or similar to parts in the Figs. 1 and 2 are indicated by similar numerals of the one hundred series.

In Fig. 5 there is illustrated a modified form of the invention and in this form parts like or similar to the parts in Figs. 1 and 2 bear similar numerals of the two hundred series. The modification disclosed herein particularly consists in the lateral extension 222 directed upwardly as

at 223 and which is continued upwardly and outwardly until the upper edge 240 engages the under surface of the yoke 209.

In Fig. 6 there is illustrated a modification of the form of the invention shown in Figs. 3 and 4. In this form of the invention numerals of the three hundred series are employed. In this form of the invention, the upper annular channel race forming member and the anchoring plate are combined as a single member.

The invention claimed is:—

1. In a caster, the combination with a load attaching portion, an upper ball retaining race forming member mounted thereon, and a spacing sleeve having a ball retaining flange at its lower end, of a yoke having a central downwardly directed countersunk portion in its upper face and a downwardly directed tubular portion extending therefrom, a race ring seatable in said countersunk portion, a tubular member having an outwardly and downwardly extending race-way and seatable in said tubular portion of said yoke and including an inwardly directed upper portion also engageable by the race ring and a lower outwardly directed portion, a lower series of balls operatively interposed between said tubular member and said sleeve, an upper series of balls interposed between said race forming member and said race ring, and means associated with the load attaching portion to secure said sleeve thereto.

2. In a double ball caster, the combination with a caster load attaching portion and a concave downwardly directed annular ball receiving channel forming portion, a spacing sleeve having an outwardly directed ball retaining flange at its lower end, a central retaining portion rigidly securing said sleeve and channel forming portion together and rigid with the load attaching portion, a caster yoke having an enlarged central aperture, a race ring member supported by said yoke, a lower series of balls, and an upper series of balls interposed between the ring member and the ball receiving channel forming portion, of an outwardly and downwardly progressively offset tubular member having an upper laterally and inwardly offset portion, said yoke having an inwardly and downwardly directed annular countersunk portion in its upper face and terminating in a downwardly directed tubular extension defining the central aperture, said tubular member being positioned within the tubular extension and having a lower end projecting outwardly and beneath the lower end of the tubular extension, said tubular member forming an inner and downwardly directed ball retaining portion cooperating with the sleeve flange, said lower series of balls being operatively interposed between said flange and the downwardly directed ball retaining portion, said race ring member being seatable upon the inwardly and downwardly directed annular counter-sunk portion of the yoke and the laterally and inwardly offset portion of the tubular member.

3. In a double ball caster, the combination with a caster load attaching portion and a concave downwardly directed annular ball receiving channel forming portion, a spacing sleeve having an outwardly directed ball retaining flange at its lower end, a central retaining portion rigidly securing said sleeve and channel forming portion together and rigid with the load attaching portion, a caster yoke having an enlarged central aperture, a race ring member supported by said yoke, a lower series of balls, and an upper se-

ries of balls interposed between the ring member and the ball receiving channel forming portion, of an outwardly and downwardly progressively offset tubular member having an upper laterally and inwardly offset portion, said yoke having an inwardly and downwardly directed annular countersunk portion in its upper face and terminating in a downwardly directed tubular extension defining the central aperture, said tubular member being positioned within the tubular extension and having a lower end projecting outwardly and beneath the lower end of the tubular extension, said tubular member forming an inner and downwardly directed ball retaining portion cooperating with the sleeve flange, said lower series of balls being operatively interposed between said flange and the downwardly directed ball retaining portion, said race ring member being seatable upon the inwardly and downwardly directed annular counter-sunk portion of the yoke and the laterally and inwardly offset portion of the tubular member, said outwardly projecting lower end of the tubular member being directed upwardly beyond the tubular extension.

4. In a double ball caster, the combination with a caster load attaching portion and a concave downwardly directed annular ball receiving channel forming portion, a spacing sleeve having an outwardly directed ball retaining flange at its lower end, a central retaining portion rigidly securing said sleeve and channel forming portion together and rigid with the load attaching portion, a caster yoke having an enlarged central aperture, a race ring member supported by said yoke, a lower series of balls, and an upper series of balls interposed between the ring member and the ball receiving channel forming portion, of an outwardly and downwardly progressively offset tubular member having an upper laterally and inwardly offset portion, said yoke having an inwardly and downwardly directed annular countersunk portion in its upper face and terminating in a downwardly directed tubular extension defining the central aperture, said tubular member being positioned within the tubular extension and having a lower end projecting outwardly and beneath the lower end of the tubular extension, said tubular member forming an inner and downwardly directed ball retaining portion cooperating with the sleeve flange, said lower series of balls being operatively interposed between said flange and the downwardly directed ball retaining portion, said race ring member being seatable upon the inwardly and downwardly directed annular countersunk portion of the yoke and the laterally and inwardly offset portion of the tubular member, said outwardly projecting lower end of the tubular member being directed upwardly beyond the tubular extension, and terminating in substantially abutting engagement with the lower surface of the yoke and surrounding the countersunk portion thereof.

5. In a double ball caster, the combination with a caster load attaching portion and a concave downwardly directed annular ball receiving channel forming portion, a spacing sleeve having an outwardly directed ball retaining flange at its lower end, a central retaining portion rigidly securing said sleeve and channel forming portion together and rigid with the load attaching portion, a caster yoke having an enlarged central aperture, a race ring member supported by said yoke, a lower series of balls, and an upper series of balls interposed between the ring member and

the ball receiving channel forming portion, of an outwardly and downwardly progressively offset tubular member having an upper laterally and inwardly offset portion, said yoke having an inwardly and downwardly directed annular countersunk portion in its upper face and terminating in a downwardly directed tubular extension defining the central aperture, said tubular member being positioned within the tubular extension and having a lower end projecting outwardly and beneath the lower end of the tubular extension, said tubular member forming an inner and downwardly directed ball retaining portion cooperating with the sleeve flange, said lower series of balls being operatively interposed between said flange and the downwardly directed ball retaining portion, said race ring member being seatable upon the inwardly and downwardly directed annular countersunk portion of the yoke and the laterally and inwardly offset portion of the tubular member, the inwardly directed upper portion of the tubular member terminating in an annular axially projecting upper end, said race ring member abutably encircling said upper end.

6. In a double ball caster, the combination with a caster load attaching portion and a concave downwardly directed annular ball receiving channel forming portion, a spacing sleeve having an outwardly directed ball retaining flange at its lower end, a central retaining portion rigidly securing said sleeve and channel forming portion together and rigid with the load attaching portion, a caster yoke having an enlarged central aperture, a race ring member supported by said yoke, a lower series of balls, and an upper series of balls interposed between the ring member and the ball receiving channel forming portion, of an outwardly and downwardly progressively offset tubular member having an upper laterally and inwardly offset portion, said yoke having an inwardly and downwardly directed annular countersunk portion in its upper face and terminating in a downwardly directed tubular extension defining the central aperture, said tubular member being positioned within the tubular extension and having a lower end projecting outwardly and beneath the lower end of the tubular extension, said tubular member forming an inner and downwardly directed ball retaining portion cooperating with the sleeve flange, said lower series of balls being operatively interposed between said flange and the downwardly directed ball retaining portion, said race ring member being seatable upon the inwardly and

downwardly directed annular countersunk portion of the yoke and the laterally and inwardly offset portion of the tubular member, said outwardly projecting lower end of the tubular member being directed upwardly beyond the tubular extension, the inwardly directed upper portion of the tubular member terminating in an annular axially projecting upper end, said race ring member abutably encircling said upper end.

7. In a double ball caster, the combination with a caster load attaching portion and a concave downwardly directed annular ball receiving channel forming portion, a spacing sleeve having an outwardly directed ball retaining flange at its lower end, a central retaining portion rigidly securing said sleeve and channel forming portion together and rigid with the load attaching portion, a caster yoke having an enlarged aperture, a race ring member supported by said yoke, a lower series of balls, and an upper series of balls interposed between the ring member and the ball receiving channel forming portion, of an outwardly and downwardly progressively offset tubular member having an upper laterally and inwardly offset portion, said yoke having an inwardly and downwardly directed annular countersunk portion in its upper face and terminating in a downwardly directed tubular extension defining the central aperture, said tubular member being positioned within the tubular extension and having a lower end projecting outwardly and beneath the lower end of the tubular extension, said tubular member forming an inner and downwardly directed ball retaining portion cooperating with the sleeve flange, said lower series of balls being operatively interposed between said flange and the downwardly directed ball retaining portion, said race ring member being seatable upon the inwardly and downwardly directed annular countersunk portion of the yoke and the laterally and inwardly offset portion of the tubular member, said outwardly projecting lower end of the tubular member being directed upwardly beyond the tubular extension, and terminating in substantially abutting engagement with the lower surface of the yoke and surrounding the countersunk portion thereof, the inwardly directed upper portion of the tubular member terminating in an annular axially projecting upper end, said race ring member abutably encircling said upper end.

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