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(54) Title: ROLLER FITTING FOR A BICYCLE

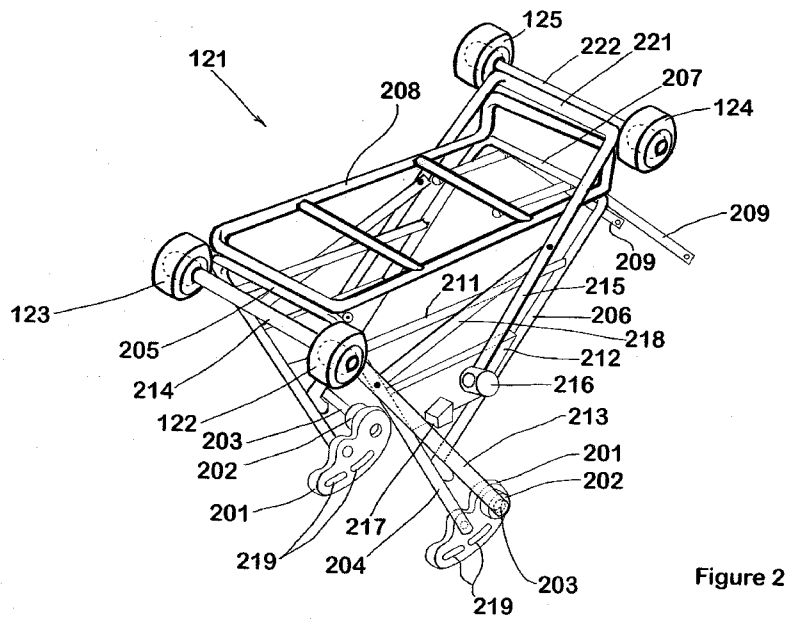

Figure 2

(57) Abstract: A roller fitting for a bicycle includes a fixed frame (204, 206, 208, 211) attachable to a bicycle. A pivotable frame is attached to the fixed frame at four pivot points (203, 216), two of which are on each side of fixed frame. First and second of the pivot points (203) are located proximal to the first extremity of the fixed frame and third and fourth pivot points (216) are located towards a centre of the fixed frame. The first and second pivot points (203) connect respective first and second pivotable arms (213) to the fixed frame (204, 206, 208, 21 1) and the third and fourth pivot points (216) connect respective third and fourth pivotable arms (215) to the fixed frame. The first, second, third and fourth pivotable arms (213, 215) each extend outside the fixed. frame (204, 206, 208, 21 1) and projecting beyond the circumference of the rear wheel of a bicycle to which the roller fitting may be attached. Each of the first, second third and fourth pivotable arms (213, 215) have a roller (122, 123, 124, 125) mounted at its distal end, and the pivotable arms (213, 215) are pivotable from a storage location to an in-use location.

ROLLER FITTING FOR A BICYCLE

Introduction

The present invention relates to roller attachments for folding bicycles.

Background

Bicycles are a common mode of transport universally. In some instances bicycles serve as a person's only mode of transport and may be used to commute to and from work, or to and from a shop etc. However storage of bicycles is often a problem. Often racks are located at common destinations such as outside an office building, shop or school. However many destinations do not have such storage facilities and in any event the owner of the bicycle may not wish to leave their bicycle in such a public storage facility for fear of theft or because they do not wish the bicycle to be stolen.

Folding bicycles have been known for a considerable period and are popular with people who have limited storage space or who use the bicycle as a means of transport and do not wish to leave the bicycle in a public storage facility.

Folding bicycles lend themselves to being transported in trains, carried to an office or other workplace in an elevator and stored indoors at home, however once folded, folding bicycles can be awkward to move about, particularly by children and adults who do not poses adequate physical strength or who are smaller in stature. For such people a roller attachment for the bicycle can assist in moving the bicycle after it has been folded. Some bicycle manufacturers make such roller attachments for their bicycles but the roller attachments are not universally suitable and generally an attachment must be obtained from the bicycle manufacturer which is suited to just that manufacturers bicycles and is generally expensive.

Some bicycle manufacturers make such attachments for their folding bicycles however the bicycles of these manufactures fold in different ways such that the attachments of one manufacturer does not work on the bicycle of another manufacturer. Also the racks of some manufacturers are attached to the frame and are non-movable. These bikes can only be folded when the rear wheel swing upwards and essentially only work on bicycles of the same manufacturer. This is also the case for other bicycle manufacturers who invariably manufacture racks that will only work on bicycles of their own design.

Within this specification references to orientation and direction will be provided relative to a bicycle in its upright, in-use position except where otherwise stated, and

will assume that the article being described is attached to or associated with such a bicycle.

Summary

The present invention provides a roller fitting for a bicycle comprising:

a fixed frame attachable to a bicycle to straddle a rear wheel of the bicycle, at least two attachment points being at a first extremity of the roller fitting and arranged to attach adjacent to bicycle adjacent to either end of a rear wheel axil of the bicycle to which the roller fitting may be attached;

a pivotable frame attached to the fixed frame; and

a plurality of rollers or wheels attached to the pivotable frame whereby the pivotable frame pivots from a stored position to an in-use position.

The pivotable frame may be attached to the fixed frame at four pivot points, two of which are on each side of fixed frame. First and second of the pivot points may be located proximal to the first extremity of the fixed frame. Third and fourth of the pivot points may be located towards a centre of the fixed frame.

Respective first and second pivotable arms may be connected to the fixed frame by the first and second pivot points. Third and fourth pivotable arms may be connected to the fixed frame at the third and fourth pivot points.

Distal extremities of the third and fourth pivotable arms may project beyond an extremity of the fixed frame when rotated from the storage position to the in-use position. Further, the first and second pivotable arms may preferably project beyond the circumference of the rear wheel of a bicycle to which the roller fitting may be attached. Similarly the third and fourth pivotable arms may project beyond a circumference of the rear wheel of a bicycle to which the roller fitting may be attached when rotated from the storage position to the in-use position.

Each of the first and second pivotable arms may each have a roller mounted at its distal end. Similarly, the third and fourth pivotable arms may each have a roller mounted at its distal end.

The pivotable frame may further comprise braces between pairs of pivotable arms which cause the rollers at distal ends of the ends of the pivotable arms to remain separated from one another.

Stoppers may be mounted on the fixed frame to limit travel of the pivotable arms when moved from the storage location to the in-use location.

The fixed frame may be arranged to attach to the bicycle at least at 3 points including two points located either side of the rear wheel adjacent to or co-axial with the rear wheel axil of the bicycle.

The fixed frame may be a rack for carrying articles while the bicycle to which the roller fitting be attached is being ridden.

Brief Description

Embodiments of the invention will now be described, by way of example with reference to the accompanying drawings in which:

Figure 1 diagrammatically illustrates a folding bicycle with a roller fitting attached;

Figure 2 is a perspective view of the roller fitting (without the bicycle);

Figure 3 is a side view of the roller fitting shown in relation to a rear wheel of the bicycle, with the rollers in a stored position;

Figure 4 is a side view of the roller fitting shown in relation to a rear wheel of the bicycle, with the rollers in an in use position;

Detailed Description

Figure 1 shows a generic bicycle of the folding type. This particular bicycle folds at a single point to achieve a folded configuration in which the wheels will be approximately side by side. The bicycle comprises a forward frame member (down tube) 101, to which is attached a head tube 105. The assembly of the handle bars 106 and fork 107 are rotatably mounted in the head tube 105, and the front wheel 108 is rotatably mounted in the front fork 107. A lockable hinge 111 connects the front frame member (down tube) 101 to a rear intermediate frame member 102 and seat tube 103 which support a bottom bracket (not visible). Chain stays 113 extend from the bottom bracket (not visible) and rear struts 114 extend from the seat tube 103 to support the rear wheel 109. The pedal crank arms 112 and gears 117 are rotatably mounted through the bottom bracket (not visible) and drive the chain 118 and rear sprocket 115 to thereby drive the rear wheel 109. A saddle post 110 is telescopically mounted in the seat tube 103 and a saddle 104 is mounted on the saddle post 110.

A roller attachment generally indicated as item 121 is attached to the bicycle in a manner that will be described below. The roller attachment 121 includes rollers 122, 123, 124 & 125 which may be used to assist in moving the bicycle when the bicycle is in a folded state. In **Figure 1** the rollers are shown in a stored location which is the preferred location of the rollers while the bicycle is being ridden (see also **Figures 2 &**

3). When the bicycle is in a folded configuration the rollers can be pivoted to a more rearward location as seen in **Figure 4**, such that the rollers are clear of the saddle and a rack portion of the roller attachment 121.

Referring to **Figure 2**, the roller attachment 121 is shown in greater detail in perspective view (without the bicycle). First and second mounting members 201 comprise a slotted bracket which is mountable to the bicycle frame at the end of the chain stays 113, by bolting through one of the slots 219, either directly to the chain stays 113 or under the rear axle nut. The first and second mounting members 201 support a frame of a roller attachment comprising substantially upright members 204 extending from the first and second mounting members 201 and a cross member 205 connecting the distal ends of the substantially upright members 204 forming an inverted "U" shape which spans the rear wheel 109 (not shown in **Figure 2**). Forward frame members 206 extend from the frame members 204 and are connected at their distal ends by bridging members 207. A parcel rack 208 comprising longitudinal and cross members forms the top of the frame and provides a rack surface on which articles may be carried. Forward mounting members 209 extend from a cross member of the parcel rack 208 and are adapted to connect to the frame of the bicycle (e.g. to the seat tube 103) to securely mount the rack to the bicycle.

Cross braces 211 and 212 extend between the frame members 204 and 206 to stiffen the frame. Brace members 212 comprise plates to which forward pivotable arms 215 are pivotally connected by pivotal mounting points 216. The two forward pivotable arms 215 are bridged by a cross member 221 and an axil 222 to which the rollers 124 & 125 are attached. A stopper 217 is also mounted on the each of the braces 212 to limit rotation of the forward pivotable arms 215 as discussed below.

Rear pivotable arms 213 are pivotally connected by pivotal mounting points 203 to the first and second mounting members 201 and spaced from the first and second mounting members 201 by projections 202. The rear pivotable arms 213 are bridged by an axil 214 to which the rollers 122 & 123 are attached. Braces 218 extend between each of the rear pivotable arms 213 and the forward pivotable arms 215 to maintain the separation of the rollers 122 & 124, and the rollers 123 & 125 in the longitudinal or fore and aft direction. It should be noted that the separation of the pivot points 203 and 216 will result in a variation in the separation of the rollers 122 & 124, and the rollers 123 & 125 when the rear pivotable arms 213 and the forward pivotable arms 215 are pivoted from the rest position shown in **Figures 2 & 3** to the in-use position shown in **Figure 4** (discussed below).

Referring to **Figures 3 & 4**, the rollers 122, 123, 124 & 125 are shown in their stored position (**Figure 3**) and their in-use position (**Figure 4**). In the stored position, the rear rollers 122 & 123 sit just behind the parcel rack 208 and the front rollers 124 & 125 sit above the forward end of the parcel rack 208. Before folding the bike for rolling on the rollers 122, 123, 124 & 125, the rollers must be pivoted to the in-use position (**Figure 4**) in which the rear rollers 122 & 123 become the lowermost rollers and the front rollers 124 & 125 become the uppermost rollers and the forward (now uppermost) pivotable arms 215 will rest against the stoppers 217, in a position which also prevents the rear arms 213 from hitting the derailleur. With the rollers in this position the bicycle may be folded and the rollers 122, 123, 124 & 125 will remain outside the envelope of the bicycle frame and wheels to allow rolling of the bicycle on the rollers. When the bicycle is folded and supported on the rollers 122, 123, 124, 125, the centre of mass of the bicycle will be above a point between the four rollers such that the bicycle will be stably supported with the forward pivotable arms 215 pressed against the stoppers 217, without any tendency for the rollers to fold toward the folded (**Figure 3**) position and therefore the rack requires only gravity to remain in this position. During the pivoting operation in which the rollers move from the stored position to the in-use position, the cross member 221 and the axil 222 must be able to pass over the rear extremity of the parcel rack 208. Therefore the length of the forward pivotable arms 215 should be greater than the distance from the pivot point 216 to the rear extremity 402 of the parcel rack 208, as well as being approximately the same length as the distance between the pivot point 216 and the forward upper extremity of the rack for storage. The forward pivotable arms 215 and the rear pivotable arms 213 must also be sufficiently long that when the rollers 122, 123, 124 & 125 are in the in-use position (**Figure 4**), the bicycle is folded and all of the rollers 122, 123, 124 & 125 are touching the ground, the wheels108 & 109 of the bicycle are lifted above the ground. That is to say, (referring to **Figure 4**) a plane 401 tangential to all of the rollers 122, 123, 124 & 125 must not cut through either of the wheels 108 & 109 of the folded bicycle and will preferably clear each of the wheels.

In the storage position (**Figure 3**), the pivotable arms may be held in place by Velcro TM between the axil 214 bridging the rear pivotable arms 213 and the rear most point 402 of the parcel rack 208. Alternatively a device (not shown) might be provided for this purpose.

It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the above-described embodiments, without departing from the broad general scope of the present disclosure. The present

embodiments are, therefore, to be considered in all respects as illustrative and not restrictive.

CLAIMS:

1. A roller fitting for a bicycle comprising:

a fixed frame attachable to a bicycle to straddle a rear wheel of the bicycle, at least two attachment points being at a first extremity of the roller fitting and arranged to attach adjacent to bicycle adjacent to either end of a rear wheel axil of the bicycle to which the roller fitting may be attached;

a pivotable frame attached to the fixed frame; and

a plurality of rollers or wheels attached to the pivotable frame whereby the pivotable frame pivots from a stored position to an in-use position.

2. The roller fitting as claimed in claim 1 wherein the pivotable frame is attached to the fixed frame at four pivot points, two of which are on each side of fixed frame.

3. The roller fitting as claimed in claim 2 wherein first and second of the pivot points are located proximal to the first extremity of the fixed frame.

4. The roller fitting as claimed in claim 3 wherein respective first and second pivotable arms are connected to the fixed frame by the first and second pivot points.

5. The roller fitting as claimed in claim 4 wherein the first and second pivotable arms project beyond the circumference of the rear wheel of a bicycle to which the roller fitting may be attached.

6. The roller fitting as claimed in claim 4 or 5 wherein each of the first and second pivotable arms have a roller mounted at its distal end.

7. The roller fitting as claimed in claim 3, 4, 5 or 6 wherein third and fourth of the pivot points are located towards a centre of the fixed frame.

8. The roller fitting as claimed in claim 7 wherein third and fourth pivotable arms are connected to the fixed frame at the third and fourth pivot points, and distal extremities of the third and fourth pivotable arms project beyond an extremity of the fixed frame when rotated from the storage position to the in-use position.

9. The roller fitting as claimed in claim 8 wherein the third and fourth pivotable arms project beyond a circumference of the rear wheel of a bicycle to which the roller fitting may be attached when rotated from the storage position to the in-use position.

10. The roller fitting as claimed in claim 8 or 9 wherein each of the third and fourth pivotable arms has a roller mounted at its distal end.

11. The roller fitting as claimed in any one of claims 3 to 10 wherein the pivotable frame comprises braces between pairs of the pivotable arms to cause the rollers at distal ends of the pivotable arms to remain separated from one another.

12. The roller fitting as claimed in any one of claims 3 to 11 wherein stoppers are mounted on the fixed frame to limit travel of the pivotable arms when moved from the storage location to the in-use location.

13. The roller fitting as claimed in any one of claims 1 to 12 wherein the fixed frame is arranged to attach to the bicycle at least at 3 points including two points located either side of the rear wheel adjacent to or co-axial with the rear wheel axil of the bicycle.

14. The roller fitting as claimed in any one of claims 1 to 13 wherein the fixed frame is a rack for carrying articles while the bicycle to which the roller fitting be attached is being ridden.

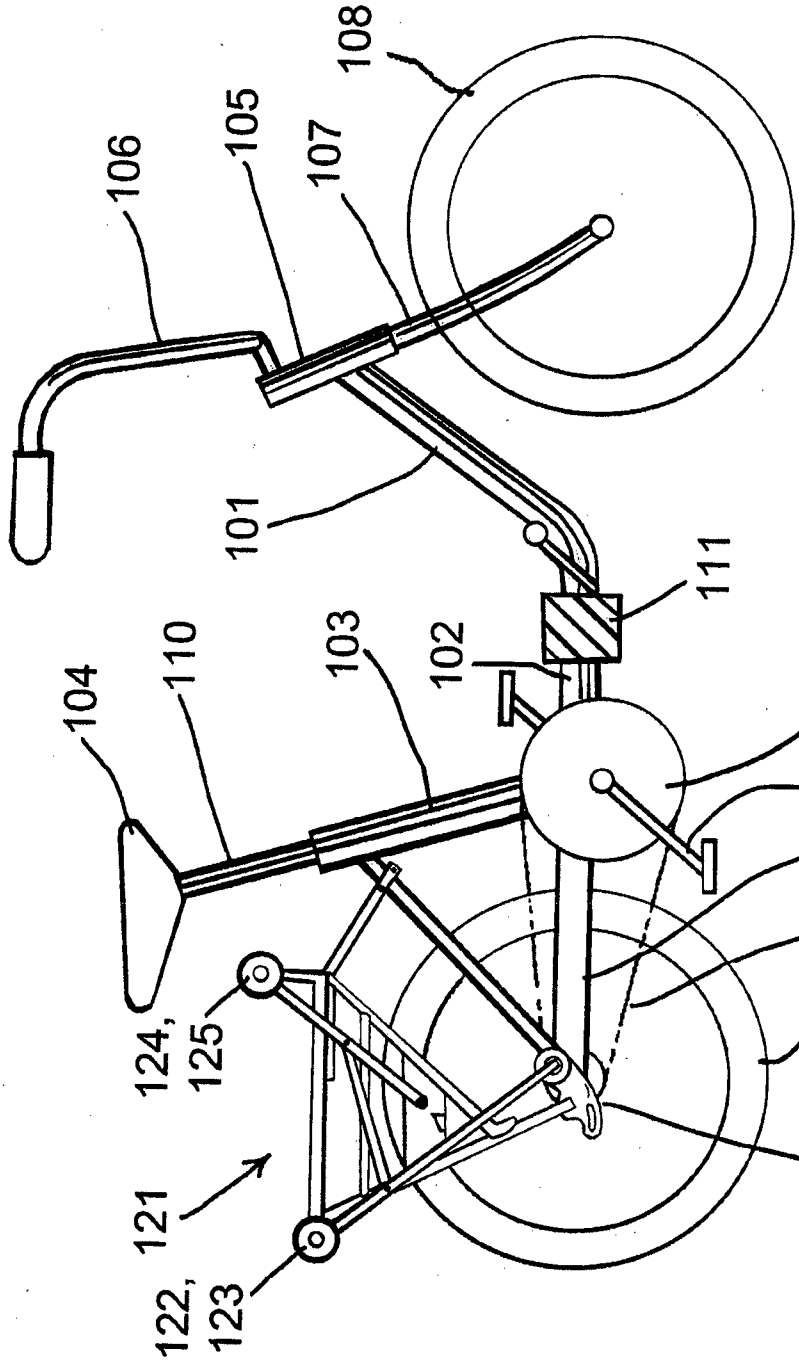
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FIGURE 1

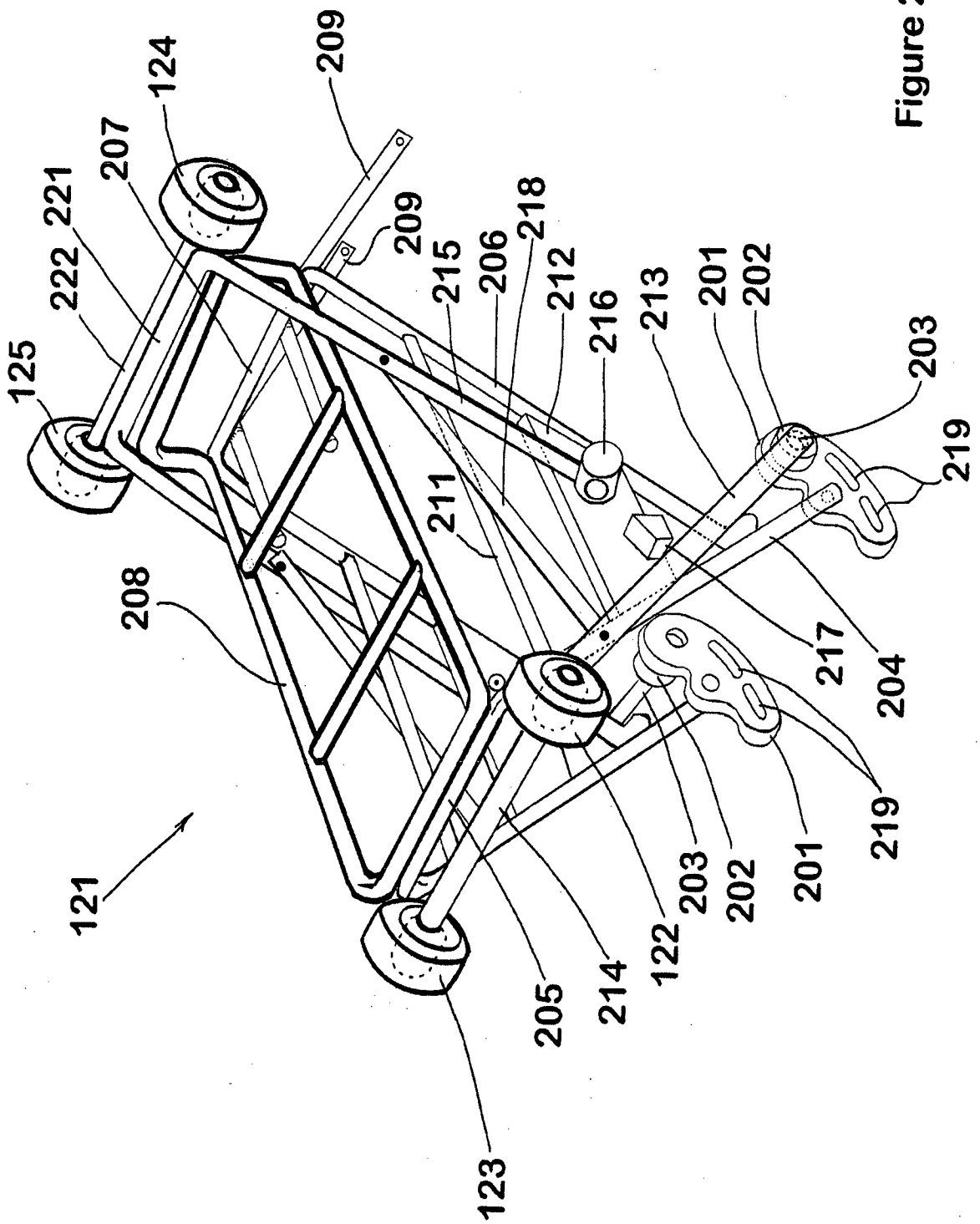
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Figure 2

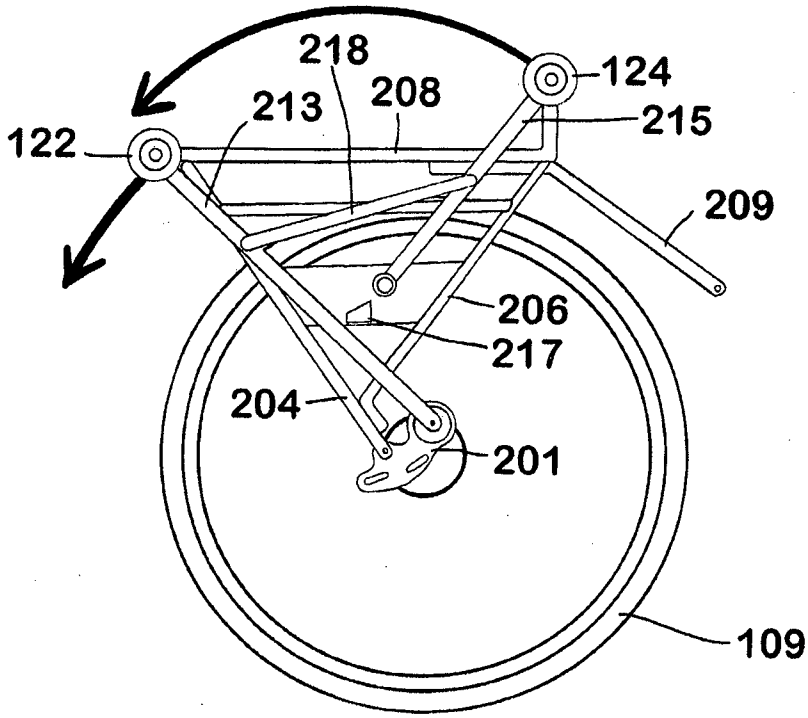

Figure 3

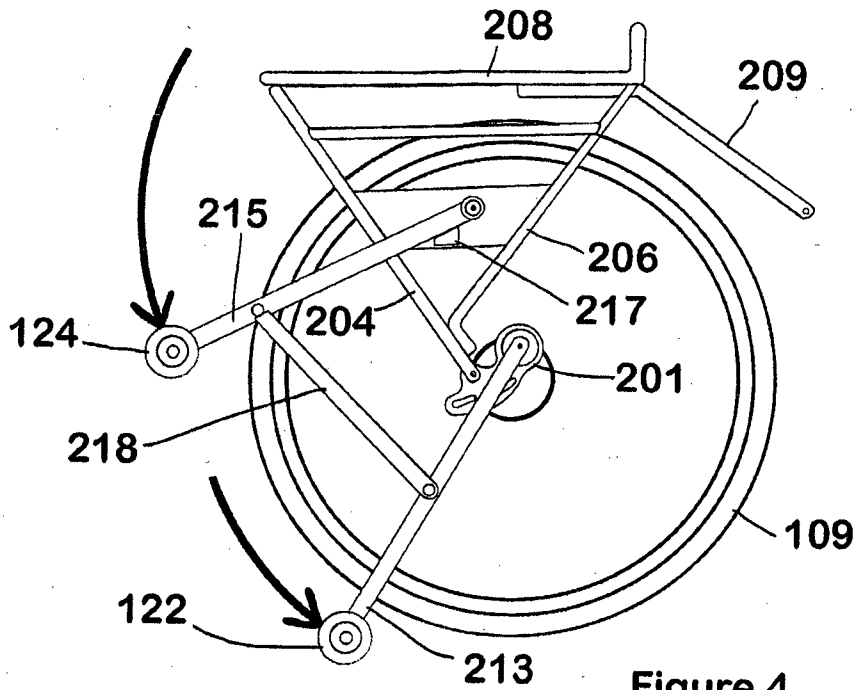

Figure 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG2013/000365

A. CLASSIFICATION OF SUBJECT MATTER

B62H 1/04 (2006.01) B62K 15/00 (2006.01) B62J 7/04 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI: CPC - B62H1, B62H7, B62H2700, B62J7, B62K15, B62K19/46 and keywords (roller, caster, pivot, swing, frame, rear wheel and like terms)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	

[X] Further documents are listed in the continuation of Box C

[X] See patent family annex

* Special categories of cited documents:

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
8 October 2013	08 October 2013
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustralia.gov.au Facsimile No.: +61 2 6283 7999	**Authorised officer** Darcy Corbett AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. 0262832212

INTERNATIONAL SEARCH REPORT		International application No.
C (Continuation).	DOCUMENTS CONSIDERED TO BE RELEVANT	**PCT/SG2013/000365**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2371668 A1 (BUSH) 05 October 2011 Paragraph [0016], Figures	1-9, 12-14
X	US 7341270 B1 (SCHOLZ) 11 March 2008 Figures	1-9, 11-13
X	JP 2010-184523 A (UMAJI YASUO) 26 August 2010 Figures	1-13

INTERNATIONAL SEARCH REPORT Information on patent family members	International application No. **PCT/SG2013/000365**

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document/s Cited in Search Report		Patent Family Member/s	
Publication Number	**Publication Date**	**Publication Number**	**Publication Date**
EP 2371668 A1	05 Oct 2011	GB 2479123 A	05 Oct 2011
US 7341270 B1	11 Mar 2008	None	
JP 2010-184523 A	26 Aug 2010	JP 4875114 B2	15 Feb 2012

End of Annex

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.