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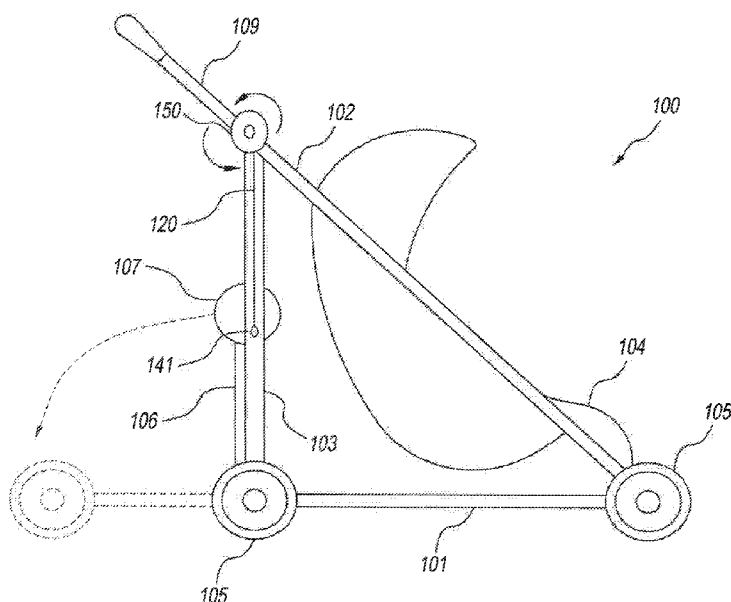


FIG 1

(57) Abstract: A stroller for carrying a child or child restraint system, that may comprise an additional storage area or child support system when expanded. The frames include a mechanism whereby the base of the frame is expanded rearward to create a storage space roughly behind the baby seat, and optionally where a top to the storage area folds up from the rear of the frame to complete the storage area. The stroller may include detachable wheels. The stroller may also include handles or push bars that may optionally include mechanisms to assist in expanding or contracting the storage area. The stroller may also be constructed so as to be collapsible for storage.



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STROLLER WITH EXPANDABLE CARGO AREA

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application is related to, claims the benefit of and priority from United States patent application serial number 14/069,169, filed October 31, 2013, which in turn claims the benefit of United States United States provisional patent application serial number 61/720,605, entitled Stroller with Expandable Cargo Area, filed October 31, 2012, the disclosures of which are incorporated herein by reference.

FIELD OF INVENTION

[0002] The present invention relates to baby strollers, and more particularly baby strollers which can be expanded or configured in such a way as to provide additional storage capabilities.

BRIEF DESCRIPTION OF THE INVENTION

[0003] The present invention relates to a baby stroller with enhanced capabilities for storage and/or multi-child configurations. The stroller in the present invention is capable of expanding from the rear, thereby creating a cargo space, and, thus, providing the ability to

simultaneously transport a passenger such as a child, multiple children, as well as additional cargo, with or without passengers, using simple actuation mechanisms.

SUMMARY

[0004] Broadly, the present invention provides for a stroller for carrying a user, having a front frame member for supporting a seat. In one embodiment, there is a foldable rear member which folds down to create an additional base member. The foldable rear member can be actuated via a mechanism located at or near the rear frame, the nexus of the rear frame and base member, or the handle. In an alternative embodiment, there is a rear member which can expand by means of telescopically or slide-wise actuating a handle. In a third embodiment, there is an additional support member coupled between the front and rear frame member which expands to form an additional support when the base is expanded. In many embodiments, this cargo area is designed for flexibility, so that its size may be adjusted. Further, in some embodiments, the extendable cargo area includes additional seating capacity for one or more additional children.

BACKGROUND

[0005] Baby strollers have been known and used for a number of years to provide a comfortable device to move a baby or small child. The trend with baby strollers has been to reduce the size of the stroller, thus allowing it to be stored more easily. However, with the

reduction of size has come the reduction of space that the strollers provide for carrying additional cargo, or multiple children. There remains the need for a baby stroller that can accommodate a large volume of goods and/or a secondary child, while still folding to a compact state.

[0006] U.S. Pat. No. 4,878,680 describes a convertible car seat and stroller combination apparatus comprising a padded child's seat having a telescopic U-shaped handle extending upward from behind the back of the seat, and a perimeter frame having four wheels extendible downward. The apparatus is distinguishable from the present invention at least in being limited to one occupant and requiring a perimeter frame for the wheels, as well as lacking an extendable cargo area.

[0007] U.S. Pat. No. 4,896,894 describes a stroller car seat apparatus comprising a conventional infant seat having a safety harness, a U-shaped padded front guard bar, a U-shaped telescoping handle in the rear, a pivoting front footrest, and a folding rectangular scissors framework with four wheels. The apparatus is distinguishable from the present invention at least in being limited to one child, requiring an obtrusive lower framework, and lacking an extendable cargo area. [0010] U.S. Pat. No. 5,360,221 describes a baby carriage convertible to a safety car seat with a harness comprising a body assembly including a seat, a back, a footrest, and side plates. A wheel assembly is pivotally mounted on the body assembly and adapted to be folded back. A handle assembly is pivotally mounted on the body assembly and adapted to be rotated into a horizontal position. A locking assembly locks and

releases the wheel assembly. When the carriage is converted into a safety seat, the wheel assembly is released and folded back, and the handle assembly is rotated into a horizontal position to be used as an arm rest plate. The apparatus is distinguishable from the present invention at least in being limited to one child, requiring the rotation of the handle assembly to serve as an arm rest, and lacking an extendable cargo area.

[00008] U.S. Pat. No. 5,478,096 Chien Ting describes a collapsible multi-use baby carriage having a structure transformable into a dining chair, a safety seat in a car, a cradle, and a bed comprising a seat, a backrest pivotally connected with the seat to change the angle of the backrest, a U-shaped hand rest pivotally connected with the backrest. The structure has a pushing handle, two opposite telescopic side tubes with a windable support plate between the side tubes, and a winding tubular shaft housed in a front tube of the hand rest for pulling out for supporting food. Two front and rear casters are pivotally connected with the bottom of the seat and foldable to the seat bottom. The carriage is distinguishable from the present invention at least in being limited to one child, requiring a windable support plate and two opposite side tubes, and lacking an extendable cargo area.

[0009] U.S. Pat. Nos. 6,523,840 , 6,669,212 B2 and 6,523,840 B1 (related patents) describe a combined shopping cart stroller, with a frame that includes a primarily horizontal lower frame portion having a forward end and a rearward end; a curved upper frame portion; vertical support extending between the lower frame portion and upper frame portion; a seat mounted to the frame; and a primary cargo area, which is defined as the space generally

bounded by the lower frame portion and the upper frame portion rearward of the seating area. The shopping cart stroller is distinguished from the present invention at least in the front frame not extending to a point above the rearward frame when the cargo space is engaged, the manner in which the primary cargo space extends, as well as the fact that the primary cargo space is unable to support the weight of an additional child.

[0010] U.S. Pat. No. 7,188,858 B2 describes a collapsible stroller, with a frame having left and right sides, each side comprising: an elongated bottom member; a front leg; a push arm; and a support strut, wherein the front leg, the push arm, and the support strut pivot relative to each other when the stroller moves between the open position and the folded position. The stroller is distinguishable from the current invention at least in being limited to one child, and not having an extendable rear cargo space.

[0011] U.K. Patent Application No. GB 2 262 914 A published on Jul. 7, 1993, describes a molded child seat for a vehicle and convertible into a pushchair comprising a supporting frame having two triangular lateral sub-frames interconnected by cross rails. Each sub-frame is equipped with a pair of mounting pins adapted to engage with appropriately shaped and positioned slots on the wheeled pushchair frame. The apparatus is distinguishable from the present invention at least in being limited to one child, requiring a separate supporting frame, and lacking an extendable cargo area.

[0012] U.S. Pat. No. 5,544,904 discloses a convertible stroller and shopping cart having a

stroller portion and a shopping cart portion. The stroller portion includes a seat secured to a metal frame, and the shopping cart portion comprises a collapsible receptacle. The receptacle can be oriented in two orientations, a stowed orientation adjacent the seat and a deployed orientation over the seat. When the receptacle is deployed, it conforms to the seat, creating a shopping cart from the stroller. The convertible stroller is distinguishable from the present invention at least in lacking the capacity to carry a second child, and in the fact that the extendable cargo area extends to occupy the same volume as the child seat when extended.

[0013] U.S. Pat. No. 6,669,212 discloses a cart having a frame member including upright and lateral frame portions. A platform is attached to the lateral frame portion and a stationary seat assembly is secured to the upright frame portion. The stationary seat assembly includes a rearward facing stationary seat, a handle and a safety bar between the seat and the handle. A pivoting mechanism is mounted to the lateral frame portion remote from the upright frame portion. The pivoting mechanism is moveable between a substantially upright position and a retracted position and is located relative to a back portion of the seat. A flexible receptacle is attached to the pivoting mechanism, and moves between an open and collapsed position when the pivoting mechanism is moved between the substantially upright and the retracted position, respectively. The stationary seat and the platform are accessible when the pivoting mechanism is in the substantially upright position or the retracted position. The cart is distinguishable from the present invention at least in that the present invention is fully collapsible, can accommodate a second child, and in having an extendable cargo area which includes an extendable base component.

[0014] U.S. Pat. No. 6,378,891 and 6,170,854 disclose a convertible stroller and shopping vehicle having a stroller portion and a shopping vehicle portion. The stroller portion includes a seat which is movable from a deployed position to a stowed position. In the deployed position, the invention is used as a stroller. The shopping vehicle portion includes a collapsible receptacle that can be oriented in one of two orientations. In an open orientation, the receptacle creates a shopping cart while in a collapsed orientation the invention can be used to transport bulk materials. The convertible stroller is distinguishable from the present invention at least by lacking the capacity to carry a second child, and in the fact that the extendable cargo area extends to occupy the same volume as the child seat when extended.

[0015] U.S. Pat. No. 8,070,180 (which has the same inventor as the present invention) discloses a stroller for carrying a user, and having an expandable storage space located between the child seat and the rearmost frame members. This may include a first and second front frame member for supporting a seat or seats and back support member, a first and second back frame member being connected to the first and second front frame member, an expandable base member, which connects between the first and second front frame member and the first and second back frame member. The expandable frame member may move between an extended and a retracted position to provide a storage area. This invention discloses a stroller with an expandable storage space, however, the volume of the storage space is not adjustable, the invention does not provide mechanisms for actuating the deployment of the extendable cargo area, the invention does not provide a rear handle lock to

take the load of additional cargo, the invention does not provide a solution for folding the front seat compactly and independently of the rear frame, the invention does not provide methods for compactly folding the upper expandable basket, and the invention does not provide for additional seating configurations within the expandable storage space.

[0016] U.S. Pat. No. 6676140 B1 discloses a two-seat collapsible stroller comprising a telescopically collapsing rear section that roughly slides into the front section such that the seat nests onto the front seat in the collapsed position. This stroller differs from the present invention at least in that the second seat is a mandatory part of the invention, and no extendable cargo area exists.

[0017] US Pat. No. 8366141 discloses a stroller with a collapsible seat for a second child, comprising a complex coupling mechanism that enables the collapse and expansion mechanism. It is distinguishable from the present invention at least in that the stroller's collapse mechanism for the second seat is substantially more complex than in the present invention, and in that it does not provide for the option of an extendable cargo area.

[0018] In general, the prior art contains a series of weaknesses which the present invention addresses. First, most prior art lacks the capacity to form an extendable cargo area while simultaneously carrying even a single child: the cargo area extends into the area where the child would sit. Second, those few inventions designed to include a second child both lack the flexibility to also include extendable storage, and include complex or inflexible deployment

mechanisms which prevent the strollers from being deployed easily and/or folded into compact form. The present invention, as will be shown, is capable of simultaneously carrying a child and having the cargo area extended/deployed in a way that can handle heavy loads, is easily expanded via actuation mechanisms, is of such a nature that it can also function as additional seating space for additional children. Finally, the present invention is designed to be easily folded into a compact state for travel or storage.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The invention may be understood by reference to the following description taken in conjunction with the accompanying drawings, in which, like reference numerals identify like elements, and in which:

[0020] FIG. 1 illustrates a side elevational view of the preferred embodiment of the stroller in a retracted position;

[0021] FIG. 2 illustrates a side elevational view of the preferred embodiment of the stroller with the rear member expanded;

[0022] FIG. 3a. illustrates a side elevational view of an alternative embodiment of the stroller, in which the rear member is not expanded, and in which a cable, being connected to an

extendable handle and extendable base member, runs through the frame, so that a user can engage the rear extendable member by actuating the handle;

[0023] FIG. 3b. illustrates a side elevational view of an alternative embodiment of the stroller, in which the rear member is in the process of being expanded;

[0024] FIG. 3c. illustrates a side elevational view of an alternative embodiment of the stroller in which the rear member is shown being further expanded;

[0025] FIG. 3d. illustrates a side elevational view of an alternative embodiment of the stroller in which the rear member is shown fully expanded;

[0026] FIG. 4 illustrates a side elevational view of an alternative embodiment of the stroller, in which the rear member is not expanded, in which an expandable frame member is engaged via sliding support members and joint members;

[0027] FIG. 5 illustrates a rear perspective view of an alternative embodiment of the stroller as illustrated in FIG. 11, in which the rear member is not expanded;

[0028] FIG. 6 illustrates a side elevational view of an alternative embodiment of the stroller as illustrated in FIG. 11, in which the rear member is in the process of being expanded;

[0029] FIG. 7 illustrates a rear perspective view of an alternative embodiment of the stroller as illustrated in FIG. 11, in which the rear member is in the process of being expanded;

[0030] FIG. 8 illustrates a side elevational view of an alternative embodiment of the stroller as illustrated in FIG. 11, in which the rear member is fully expanded;

[0031] FIG. 9 illustrates a rear perspective view of an alternative embodiment of the stroller as illustrated in FIG. 11, in which the rear member is fully expanded;

[0033] FIG. 10 illustrates a side elevational view of an alternative embodiment of the stroller as illustrated in FIG. 11, where the stroller is in a folded position;

[0034] FIG. 11 illustrates a rear perspective view of an alternative embodiment of the stroller as illustrated in FIG. 11, where the stroller is in a folded position.

[0035] Fig. 12 illustrates an alternative embodiment of the stroller having selectively foldable front frame members.

[0036] Fig. 13 illustrates an alternative embodiment of the stroller having a rear child seat.

[0037] Fig. 14 illustrates a specific alternative embodiment of a basket for the stroller.

[0038] Fig. 15A illustrates a specific exemplary embodiment of a rear handle lock of the stroller.

[0039] Fig. 15B illustrates the lock of Fig. 15A assembled.

[0040] Fig. 15C illustrates the lock of Fig. 15B in an exploded view.

DETAILED DESCRIPTION

[0041] The following description of the preferred embodiment or embodiments is not intended to limit the scope of the invention to the precise form or forms disclosed, but instead is intended to be illustrative of the principles of the invention so that others skilled in the art may follow its teachings.

[0042] In general, the expandable stroller of the present invention comprises two mirror-imaged structural frames connected to each other by cross members. As the cross members may be placed in any suitable position, and since the structural frame members are mirror images, the discussion of the structure of the present invention will focus on a single frame. One skilled in the art will recognize that the description will apply equally to the mirrored frame.

[0043] FIG. 1 illustrates a stroller **100** in accordance with the teachings of the present invention without the rear member engaged, shown at a side elevational view. FIG. 1 illustrates a base main frame member **101** roughly parallel to the ground, a diagonal main frame member **102**, and a rear main frame member **103** roughly perpendicular to the ground. The main frame section of the present invention, comprised of members **101**, **102**, and **103** is comprised of two mirror sides, connected by cross members. The bottom end, or a section substantially near the bottom end of frame member **103** is connected to frame member **101** at or substantially near the rear end of frame member **101**. In the present embodiment, frame members **101** and **103** are connected at or substantially at a right angle, so that frame member **101** is parallel or substantially parallel to the ground, and frame member **103** is vertical or substantially vertical. In some embodiments, the angle at which frame members **101** and **103** are connected may be substantially acute or obtuse. In some embodiments, frame member **103** may attach near the middle or front of member **101**. In some alternative embodiments, frame member **103** may be located generally mid-way along member **101**. In some alternative embodiments, frame member **103** may be located near the nexus of member **101** and **104**. In some alternative embodiments, frame member **103** may not be present.

[0044] FIG. 1 further illustrates frame member **102**, which connects to frame members **101** and **103** to complete the main frame section. FIG. 1 illustrates that the top, or a section substantially near the top, of frame member **102** is connected at or substantially near the top of frame member **103**, and the bottom, or a section substantially near the bottom, of

frame member **102** is connected at or substantially near the front of frame member **101**. In some alternative embodiments, frame member **103** may be joined to frame member **102** at alternative locations, such as nearer to the middle or front of frame member **102**. One skilled in the art will recognize that the location of the connections between members **102** and **103**, and **101** and **103** will largely determine the angle of **103**.

[0045] In the present invention, members **101**, **102**, and **103** are made out of a single piece of material. In alternative embodiments, member **101**, **102**, and **103** may be composed of two or more separate components, so as to change the angle of the handle of the stroller, and to enable folding (see FIGS. 5a-d, 6, 12, and 13). The means with which frame members **101**, **102**, and **103** are connected can be by screws, brackets, welds, rivets or any other suitably strong means. Additionally, frame members **101**, **102**, and **103** may be made of metal, plastic, or any other suitably strong material. In alternative embodiments, there may be handles connected at or near the junctions of frame members **102** and **103**, or at the top-rearmost end of member **102**. Furthermore, the handle may serve as a cross-member, linking the mirrored frames of the invention.

[0046] FIG. 1 illustrates that the wheel members **105** are attached at or around the junctions of frame members **101** and **102**, and **101** and **103**. In the present embodiment, wheel members **105** can rotate freely 360 degrees along the axis (as, e.g., swivel wheels). In alternative embodiments, the wheels can have other degrees of rotational freedom. FIG. 1 illustrates seat member **104**, which is attached to frame member **102**. Seat member **104**

may be made from a flexible material, for example fabric or durable plastic cloth.

Alternatively, seat member **104** may be made from a harder material, for example solid plastic, metal, or any other suitable material, and may or may not be covered with a padding material for child comfort. The present invention shows seat member **104** containing a canopy, in order to protect a child from sun, rain, or any other weather. In a preferred embodiment, this canopy is retractable, allowing the child to enjoy pleasant weather. In alternative embodiments, this canopy may be fixed in a way so that it cannot be retracted, or it may be absent altogether. In alternative embodiments, seat member **104** may be replaced by at least one seat attachment device, in which alternate seat configurations such as modular seats, car seats, carry cots or alternate child restraint systems may be mounted to the seat attachment device and or frame support members.

[0047] FIG. 1 additionally illustrates a foldable base member **106**, which folds and/or pivots out to form a rear base member. FIG. 1 shows this rear member in a retracted position, so that the rear member is not engaged. FIG. 1 illustrates member **106** attached to the main frame section at or substantially near the nexus of main frame members **101** and **103**. In alternative embodiments, member **106** may be attached to member **101**, or the wheel/wheel assembly of member **105**. In the current embodiment, member **106** is deployed via actuator **150**, which engages cable **120** to release pin **141**. In alternate embodiments, the location of actuators and locking devices or cables may be at any point along the frame or wheel members. In alternate embodiments, actuators may be levers, buttons, or any other suitable device for deploying member **106**. When folded up, member **106** may sit

substantially vertical, and flush up against frame member **103**, and when folded down, member **106** may sit substantially parallel to the ground, aligned to be roughly parallel with frame member **101**. In alternative embodiments, stowed, member **106** may sit parallel to member **101**, or at any suitable position between members **101** and **103**. Member **106** can be constructed of metal, plastic or any other suitably strong material so as to support the weight of a child and/or any additional items carried in the cargo area when the stroller is configured as such. The present invention shows member **106** as being a single piece of material. In alternative embodiments, member **106** may be comprised of multiple parts, so as to be telescopic (retracting and extending), slideable, or otherwise shortenable so as to be less noticeable when folded up. Additionally, member **106** may be made so as to be completely detachable. In some embodiments, member **106** may be attached via a quick-release mechanism.

[0048] FIG. 1 illustrates a wheel member **107**, which is attached at or substantially near the top of member **106** (when member **106** is folded vertically), so that when folded down, the base of the rear cargo section is more stable because of the support provided by wheel **107**. In alternate embodiments, wheel member **107** may not be attached to member **106**, if member **106** is of a length that does not require additional support. The wheel member **107** can comprise one or a plurality of wheels. In the present embodiment, wheel member **107** can only rotate at a limited angle along the axis (e.g., a limited-movement swivel). In alternative embodiments, the wheel or wheels can have other degrees of rotational freedom.

[0049] FIG. 1 illustrates handle member **109**, which is pivotably affixed to frame member **102**. In alternative embodiments, member **109** may be attached to, or be an integral part of a telescopic expansion of mirrored frame members **102** (as in FIG. 5). In some embodiments, handle **109** may be attached to mirrored frame members **103**, or may be attached to, or be an integral part of a telescopic expansion of mirrored frame members **103**. The range of motion at which member **109** can pivot is not limited to particular angles with respect to member **(103) 102**. Additionally, in alternative embodiments, member **109** may be connected to a different member of the main frame section, as long as its primary functionality of providing a comfortable pushing and steering mechanism for the device is maintained. Member **109** can be made out of metal, plastic, or any other similarly suitable material. In alternative embodiments, the handle **109** can be shaped differently; with its design not being limited to any particular curved or straight shapes, and in alternative embodiments may be designed as two separate left and right handles (hence not linking mirrored frame members). This handle **109** can be made out of plastic, metal, or some other suitable material, and may additionally be wrapped in foam, rubber, fabric, or some other padding material.

[0050] FIG. 2 illustrates a stroller **100** in accordance with the teachings of the present invention with the rear member in the deployed state. The embodiment shown is similar to that shown in FIG. 1, but with the rear member folded down along its joint with the structural frame so as to be roughly parallel to the ground and member **101**. FIG. 2 additionally shows the position of wheel member **107** when member **106** is folded down- the wheel is now in

contact with the ground so as to provide support for member **106**. Additionally, FIG. 2 illustrates how handle **109** can be constructed to telescopically expand as a means to lengthen the handle. In the illustrated embodiment, the telescopic expansion of handle 109 actuates the deployment of rear member 106 by pulling cable 120 which engages pulley 121 to release pin 141. In other embodiments, the placement of pin 141 can be located at any location in which release of member 106 or wheel member 107 can occur. In other embodiments, pin 141 may be a lock, clamp, or other retaining mechanism to allow member **106** to move from a stowed to a deployed state (See FIGS. 5A-d for more detail). In alternative embodiments, a lever or button actuation mechanism can release the pin, lock, clamp, or other retaining mechanism holding member **106**, thus allowing it to deploy. In other embodiments, the cable and/or pulley mechanisms may run through or along other frame members, or any combination of frame members which result in deployment of member 106. The lever or button to release member **106** can be located at many locations along stroller **100**, and may be actuated by hand, by foot, or a combination of the two.

[0051] FIG. 3a illustrates a stroller **100** in accordance with the teachings of the present invention, shown at a side elevational view with the rear base member not engaged, and with alternative embodiments in some of the members. FIG. 3a. illustrates base main frame member **101**, expandable base main frame member **101b**, front frame members **102** and **102a**, and rear main frame member **103**. The main frame section of the present invention is comprised of mirrored structural frames connected by cross members, each mirrored structural frame comprising members **101**, **101b**, **102**, **102a**, and **103**.

[0052] FIG. 3a. illustrates the base of the stroller **100** as being comprised of frame members **101** and **101b**, and as being substantially parallel with the ground. FIG. 5a. illustrates frame member **101** as forming the frontward section of the extendable base frame member, and **101b** as forming the rearward section of the extendable base frame member. Members **101** and **101b** are designed to form an expanding base. This is accomplished by having parts **101** and **101b** move parallel relative to one another. In some embodiments, this may be done by having the two components slide (as, e.g., on rails) parallel to each other. In other embodiments, one component may telescope within another. In other embodiments still, one component or another may be made of sub-components which allow the part itself to telescope within itself. Specifically, FIG. 5a. illustrates frame member **101** fitting inside extendable frame member **101b**. In an alternative embodiment, member **101b** can fit inside member **101**; in yet another alternative embodiment, member **101b** itself may be composed of multiple, telescoping components. In yet another embodiment, member **101** may have rails on which **101b** moves. In still other embodiments, **101b** may have rails along which **101** moves. In a further embodiment, members **101** and **101b** slide along each other for extension and retraction. The means with which members **101** and **101b** are connected can be by screws, brackets, welds, pins, rails, slots, slides, or any other suitably strong means. Members **101** and **101b** can be made out of metal, plastic, or any other similarly suitably strong material. The bottom end, or a section substantially near the bottom end, of frame member **103** is connected to the extendable frame member **101**.

[0053] In the present embodiment, frame members 101 and 103 are connected at a substantially acute angle in relation to the front of the frame, so that frame member 103 is leaning substantially towards the front of the stroller (see FIG. 5a.). In alternative embodiments, the angle at which frame members 101 and 103 are connected may be substantially more acute, obtuse, or may form a substantially right angle, with relation to the front of the stroller. The means with which frame members 101 and 103 are connected can be by screws, brackets, welds, pins, or any other suitably strong means. In alternative embodiments, the lower end of member 103 may be attached to extendable member 101b. In preferred versions of this embodiment, member 103 is slidably attached to extendable member 101b, so that the movement of member 101b does not substantially alter the angle at which 103 is attached. Member 103 can be made out of metal, plastic, or any other similarly strong material.

[0054] FIG. 3a. illustrates frame member **102**, with the bottom end, or a section substantially near the bottom end, of member **102** connecting to the front, or a section substantially near the front, of base frame member **101**. In the present embodiment, members **101** and **102** are connected at a substantially acute angle in relation to the front of the frame, so that frame member **102** is leaning substantially towards the rear of the stroller (see FIG. 5a). In alternative embodiments, the angle at which frame members **101** and **102** are connected may be substantially more obtuse, acute, or may form a substantially right angle, with relation to the front of the frame of the stroller, so long as it still forms a sturdy frame to support the potential load on the stroller. Additionally, member **102** can be made out of metal, plastic, or any other similarly strong material.

[0055] FIG. 3a. illustrates frame member **102a**, with the front of member **102a** connecting to the top of frame member **102**, with the top of member **103** connected to **102a** at about the middle of **102a's** length, thus completing the main frame section. In alternate embodiments, the nexus point at which frame members connect can be at any optimal geometric position. The means with which frame member **102a** connects to frame members **102** and **103** can be by screws, brackets, welds, pins, pivots, slides, or any other suitably strong means. Additionally, member **102a** can be made out of metal, plastic, or any other similarly strong material.

[0056] FIG. 3a. illustrates that wheel members **105** are attached at or around the junctions of frame members **101** and **102**, and near the end of **101b**. In alternate embodiments, front wheel placement can be oriented independently to either member **101**, **101b** or **102** respectively. The rear wheels **105** extend along with member **101b**, as it extends to form the rear base member. In the present embodiment, wheel members **105** can rotate freely 360 degrees along the axis, as on, e.g., a swivel. In alternative embodiments, the wheels can have other degrees of rotational freedom.

[0057] FIG. 3a. illustrates extendable handle member **102b**, cable member **120**, cable connection point **121(a and b)**, and pulley members **122**, which, in addition to extendable base member **101b**, comprise the means with which the rear base member is extended. Handle member **102b** moves parallel to member **102a**. In a preferred embodiment, this

sliding motion is accomplished by making handle member **102b** fit telescopically within **102a**. In alternative embodiments, **102b** slides next to **102a**, as though with rails, slots, slides, or other guides, or may fit inside of **102b**. In yet other embodiments, handle member **102b** comprises multiple pieces and telescopes within itself to contract and extend. Cable connection point **121a** is attached at a point along the length of handle member **102b**, and cable connection point **121b** is attached at a point along the length of **101b**. FIG. 5a.

additionally illustrates cable member **120**, which is the primary mechanism through which the rear base member is engaged and disengaged. Cable member **120** is threaded through or alongside frame members **101b**, **103**, **102a** and **102b**, and is additionally threaded through pulley members **122** in order to connect connection points **121**. FIG. 5a. illustrates pulley members **122** as being located near the junctions of members **103** and **102a**, and members **103** and **101b**, respectively. Cable member **120** can be made out of metal or some other similarly strong material. The pulley members **122** assist cable member **120** to move smoothly within the frame of the stroller **100**. In alternative embodiments, pulley members **122** may be located at different points within the frame of the stroller, or may be some similarly suitable device for assisting cable member **120** to move smoothly within the frame of the stroller. Pulley members **122** can be made out of plastic, metal, or any other suitably strong material.

[0058] FIG. 3a. illustrates extendable handle member **102b** in a substantially retracted position. When member **102b** is in a retracted position, the rear cargo area is not engaged; when member **102b** is extended by the user, member **101b** extends via cable member **120**,

connection point members **121** and pulley members **122**, thus extending the rear base member **101b**. Additionally, when fully extended, handle **102b** and member **101b** selectively lock into place, so that the rear base member **101b** and handle **102b** are selectively secured to stroller 100. Attached to the end of handle member **102b** is handle **119**. Handle **119** can have a variety of possible shapes; with its design not being limited to any particular curved or straight shapes, and in alternative embodiments may be designed as two separate left and right handles, attached to mirrored members **102b**. This handle **119** can be made out of plastic, metal, or any other suitable material, and may additionally be wrapped in foam, rubber, fabric, or any other suitable padding material.

[0059] In the present embodiment, members **102b** and **101b** are extended manually via cable member **120**, in alternative embodiments, some other mechanical device may be used to automatically extend members **102b** and **101b**. In yet other alternative embodiments, springs or some other similarly suitable means to store and release potential energy may be attached to member 102b or member 101b to assist the user in engaging the rear base member.

[0060] FIG. 3b. illustrates a stroller **100** in accordance with the teachings of the present invention, shown at a side elevational view, with members **102b** and **101b** beginning to be extended to form the rear base member.

[0061] FIG. 3c. illustrates a stroller **100** in accordance with the teachings of the present invention, shown at a side elevational view, with members **102b** and **101b** being extended further, so that the rear base member is almost fully engaged.

[0062] FIG. 3d. illustrates a stroller **100** in accordance with the teachings of the present invention, shown at a side elevational view, with members **102b** and **101b** in a fully extended and locked position, so that the rear base member is fully engaged.

[0063] FIG. 4 illustrates a stroller **100** in accordance with the teachings of the present invention, shown at a side elevational view, with the rear base member **101b** not engaged, with alternative embodiments in some of the members. Importantly, the stroller **100** illustrated in FIG. 4 has a folding capability (see FIGS. 10-11). The stroller **100** is folded via joint locking member **130**, and **128a**, and **128b**. Release of locking joint **130** allows member **103** to fold forward (see FIG. 10-11). Release of joint member **128a**, allows members **102** and **102c** to fold downward (see FIGS. 12-13). In alternative embodiments, this folding capability may not be present. Frame member **103**, seat member **104**, and wheel members **105** are functionally identical to those illustrated in FIGS 1-2 and seat member 104 is mounted to members 102. Additionally, front frame base members **101** and **101b** are functionally identical to those illustrated in FIGS. 3a-d. FIG. 4 illustrates diagonal frame member **102**, the top of which is connected to a joint member **128b** (see FIG.6), and the bottom, or a section substantially near the bottom, of member **102** being connected to joint member **128a**. FIG. 4also illustrates diagonal frame member **102c**, the top of which is

connected to joint member **128a**, and the bottom, or a section substantially near the bottom, of member **102c** is connected to member **101**. Joint member **128a** allows frame members **102** and **102c** to move from an unfolded position (see FIG. 6) to a folded position (see FIGS 10-11). Joint members **128a** and **128b** can be made out of plastic, metal, or any other suitably strong material. FIG. 4 introduces diagonal support frame member **123**. The top of diagonal support frame member **123** is connected with a slide somewhere along frame member **102**, in such a way as to allow it to slide along member **102**; the bottom of member **123** is connected at, or substantially near, the rear end of base frame member **101**. In alternative embodiments, the points at which member **123** attaches to members **102** and **101** may be different, so long as member **123** is still able to provide structural support for the main frame of the stroller and to slide during folding. In yet another embodiment, the top of member **123** may be attached to member **102c**, instead of member **102**. The means with which member **123** attaches to members **102** (or **102c**) and **101** can be by slots, screws, clamps, brackets, pins, slides or any other similarly suitable means. Additionally, member **123** can be made out of metal, plastic, or any other suitably strong material. FIG. 4 additionally illustrates footrest member **104a**, which is attached near or substantially near the front end of base frame member **101**. In alternative embodiments, member **104a** may be placed at a different location on the frame of the stroller, or may be connected to seat member **104**. Additionally, member **104a** can be made out of plastic, metal, or any other similarly suitable material, and may additionally be wrapped in foam, rubber, fabric, or some other padding material.

[0064] FIG. 5 illustrates a stroller **100** in accordance with the teachings of the present invention, shown at a rear perspective view. FIG. 5 illustrates cross members **115** and **128**; FIG. 5 additionally illustrates extendable support member **125**. In the current embodiment, member **125** is a three-sided, u-shaped tube. In alternate embodiments, **125** may be parallel tubes connected between the frame members **102** (through joint **128b**) and **103** without a third tube cross-member. In this embodiment, extendable support member **125** and expandable base frame member **101b** are the primary means with which the rear cargo area is engaged (see FIG. 8). In the un-engaged position, the top, or a portion substantially near the top, of extendable bar member **125** is connected to joint member **128b**; the bottom, or a portion substantially near the bottom, of member **125** is connected to frame member **103** in such a way as to allow it to slide vertically along member **103** and to pivot about that same point. Member **125** is able to move from a closed, substantially vertical, position, to an open, substantially horizontal, position by sliding the base of the u shape vertically along member **103**. As member **125** is lifted along member **103**, it is pushed to a substantially horizontal position (see FIG. 10) via joint members **128b**. This creates a new distance between **102** and **103**, which simultaneously causes base member **101b** to move parallel to **101** to extend the base of the frame (see FIGS. 6 and 7), which simultaneously expands member **101b**, and thus engages the rear cargo area. In alternative embodiments, there may be springs, pulleys, motors, or some other mechanism which assists the user of the stroller **100** to expand members **125** and **101b**. In alternate embodiments, member **125** may have additional expansion capabilities beyond pivoting upward, such as expanding telescopically while also pivoting into an expanded position, or expanding via hinges. When

member **125** is in a closed position, it locks into position. The means with which member **125** locks into place can be by pin, snap, strap, slot, clamp or any other similarly suitable method. Additionally, member **125** can lock into place at various intervals along the height of **103**, to provide for variable expansion. The means with which member **125** locks into place can be by pin, snap, strap, slot, clamp or any other similarly suitable method. Support member **125** can be made out of metal, plastic, or any other similarly strong material.

[0065] FIG. 6 illustrates a stroller **100** in accordance with the teachings of the present invention, shown at a side elevational view, with members **125** and **101b** in the process of being extended to form the rear cargo area. As discussed above, in some embodiments, member **125** may lock in an intermediate position along the height of **103**, thus achieving variable expansion of the base. In another embodiment, the total movement of member **125** may be limited to an intermediate position, with member **125** serving as side frame members once the extendable base has selectively expanded.

[0067] FIG. 7 illustrates a stroller **100** in accordance with the teachings of the present invention, shown at a rear perspective view, with members **125** and **101b** being extended to form the rear cargo area.

[0068] FIG. 8 illustrates a stroller **100** in accordance with the teachings of the present invention, shown at a side elevational view with the rear cargo area fully extended. FIG. 8 additionally illustrates basket member **127**, the top of which attaches to member **125**, the

front of which attaches to member 128, and the back of which attaches to member **103**. In alternate embodiments, basket member 127 may attach at or near any frame member, joint, pivot or hub in which attachment renders the basket to a usable state. Member **127** can be made out of fabric or some other similarly soft material, or may additionally be made out of plastic or some other similarly rigid material. Member **127** attaches to the frame of the stroller by snaps, straps, or any other similarly suitable means of attachment.

[0069] FIG. 9 illustrates a stroller **100** in accordance with the teachings of the present invention, shown at a rear perspective view, with the rear cargo area fully engaged.

[0070] FIG. 10 illustrates a stroller **100** in accordance with the teachings of the present invention, shown at a side elevational view in a folded position. The stroller is folded by releasing joint members **130** via a release mechanism, which allows frame member **103** to fold forward to a substantially horizontal position. Additionally, joint members **128a** and **128b** allows frame members **102** and **102c** to fold downward, thus allowing member **103** to fold fully forward. The mechanism with which joint members **130** are released can be a button, spring, latch, or any other similarly suitable method.

[0071] FIG. 11 illustrates a stroller **100** in accordance with the teachings of the present invention, shown at a rear perspective view in a folded position.

[0072] In addition to the foregoing embodiments, the present invention contemplates other specific exemplary alternative embodiments. For example, Fig. 12 illustrates a specific alternative embodiment of a stroller 100 that provides selectively foldable front frame members 102/102C in which the members are rotatably jointed to create a top portion 102 and a bottom portion 102C of each front member. An actuator, such as a cable arrangement connected to the rotatable joint of each front member, effects folding of the front members upon actuation. Specific exemplary embodiments further provide a rotatable, front member 102C extending from bottom frame member 101 which is slidably coupled to support member 102D, and from which the support member also rotatably pivots to provide support while still allowing the front members to be selectively folded or deployed. Additional specific exemplary embodiments further provide that member 102C may have a shock or damper system.

[0073] Fig. 13 illustrates an alternative embodiment of a stroller 100. Specific exemplary embodiments provide the rear cargo area with a foldable child seat 210 that is selectively detachable from the rear cargo area. For embodiments which provide floor platform 101C, platform 101C provides a floor upon which a child may step up to access the chair, or stand, as the case may be. For safety and other considerations, specific exemplary embodiments of the stroller, platform 101C is cropped to extend less than the full length of member 101B.

[0074] Fig. 14 illustrates an alternative embodiment of basket 127. Another specific alternative embodiment provides a selectively foldable basket 400 that is selectively mountable

to handle 110, front frame member 102, rear frame member 103, support member 125, or rear cargo area platform 101C_. Specific exemplary embodiments of basket 400 have one or more elastic members 410A, 410B which mount to 430A & 430B respectively, and which are held in place by restraints 420A and 420B, which combined cause basket 400 to snap into a more compact position when the basket is folded. Base panels 430A, 430B pivot around hinge 440. Side Panels 450A, 450B comprise the upper sides of basket 400. Members 460A, 460B provide a potential surface in which to mount basket 400 to stroller 100 frame members.

[0075] Fig. 15A illustrates a specific exemplary embodiment of a rear handle lock 130 of a stroller 100. A lock 130 provides, for example, a mechanism consisting of rear frame member 103 (tube), pivot, locking pins, shuttle, locking plates, spring, spring stop, lock actuator, and cable. A rear frame member 103 has slots cut into it to allow limited travel of the pins up and down parallel to the handle and along the center plane of rear frame member 103. The pivot is a metal pin, for example, that facilitates rotational motion of the rear frame member relative to the locking plates. The locking pins provide the locking bar for restraining the rear frame member's rotation relative to the locking plates. The shuttle may be a plastic part, for example, that slides up and down inside the handle tube and couples the pins so they slide up and down at the same time. The shuttle is constantly pushed upon (downward) by a spring pushing the shuttle and pins into a locked position. The shuttle has a cable attached to it in which a lock actuator on or near the handle pulls the cable and hence moves the shuttle and pins to an unlocked state. The unlocked state is a state in which the

pins are now inside the circular track of the locking plate and the rear frame member 103 can now be rotated freely to a non-use state (folded state). The locking plates may be mounted to lower frame member 101B and may be located on each side of the rear frame members 103. The locking plates may employ tracks or slide-by-slide translation and locking pockets for the pins to travel in. The pins may be spring loaded to lock into the locking pockets when the handle is rotated to the appropriate angle to line up with the locking pockets. Locking pockets may be designed for both a stowed (folded) state and erected (unfolded) state.

[0076] Fig. 15B illustrates lock 130 assembled.

[0077] Fig. 15C depicts lock 130 in an exploded view.

[0078] The illustrations of embodiments described herein are intended to provide a general understanding of the structure of various embodiments, and they are not intended to serve as a complete description of all the elements and features of apparatus and systems that might make use of the structures described herein. Many other embodiments will be apparent to those of skill in the art upon reviewing the above description. Other embodiments may be utilized and derived therefrom, such that structural, materials, and logical substitutions and changes may be made without departing from the scope of this disclosure. Figures are merely representational and may not be drawn to scale. Certain proportions thereof may be exaggerated, while others may be minimized. Accordingly, the

specification and drawings are to be regarded in an illustrative rather than a restrictive sense.

[0079] Such embodiments of the inventive subject matter may be referred to herein, individually and/or collectively, by the term “invention” merely for convenience and without intending to voluntarily limit the scope of this application to any single invention or inventive concept if more than one is in fact disclosed. Thus, although specific embodiments have been illustrated and described herein, it should be appreciated that any arrangement calculated to achieve the same purpose may be substituted for the specific embodiments shown. This disclosure is intended to cover any and all adaptations or variations of various embodiments. Combinations of the above embodiments, and other embodiments not specifically described herein, will be apparent to those of skill in the art upon reviewing the above description.

[0080] The Abstract of the Disclosure is provided to comply with 37 C.F.R. §1.72(b), requiring an abstract that will allow the reader to quickly ascertain the nature of the technical disclosure. It is submitted with the understanding that it will not be used to interpret or limit the scope or meaning of the claims. In addition, in the foregoing Detailed Description, it can be seen that various features are grouped together in a single embodiment for the purpose of streamlining the disclosure. This method of disclosure is not to be interpreted as reflecting an intention that the claimed embodiments require more features than are expressly recited in each claim. Rather, as the claims reflect, inventive

subject matter lies in less than all features of a single disclosed embodiment. Thus the following claims are hereby incorporated into the Detailed Description, with each claim standing on its own as a separate embodiment.

[0081] The description has made reference to several exemplary embodiments. It is understood, however, that the words that have been used are words of description and illustration, rather than words of limitation. Changes may be made within the purview of the appended claims, as presently stated and as amended, without departing from the scope and spirit of the disclosure in all its aspects. Although description makes reference to particular means, materials and embodiments, the disclosure is not intended to be limited to the particulars disclosed; rather, the disclosure extends to all functionally equivalent technologies, structures, methods and uses such as are within the scope of the appended claims.

What is claimed is:

1. A storable and deployable stroller for carrying one or more passengers and transporting items, the stroller comprising:
two or more stroller support members;
a plurality of wheels attached to said two or more support members;
one or more seats attached to said two or more support members above said wheels;
a selectively pivotable base member attached to at least one of said two or more support members; and
an actuation mechanism operably connected to said pivotable base member;
whereby said pivotable base member pivots from a stowed to deployed state upon selective operation of the actuation mechanism.
2. The stroller of claim 1, further comprising a rear handle attached to said two or more support members and in which the actuation mechanism is located proximate to the rear handle
3. The stroller of claim 2, wherein the pivotable base member actuation mechanism is located on one or more of the two or more support members.

4. The stroller of claim 2 wherein pivoting of the pivotable base member defines a radius of rotation, and in which the radius of rotation for the pivotable base member may be up to 360 degrees in any direction to facilitate use and storage.
5. The stroller of claim 1, in which the actuation mechanism is further comprised of at least one selectively releasable pin, which when said selectively releasable pin is released allows the pivotable base member to pivot at least partially through the radius of rotation.
6. The stroller of claim 1, in which the two or more support members are selectively movable toward the pivotable base member to create a more compact state of the stroller.
7. The stroller of claim 1, wherein the said seat is selectively attachable to at least one of said two or more support members, said seat further comprising a seat attachment system.

8. A stroller as in claim 1 wherein the pivotable base member, optionally detachable from the stroller.
9. A selectively extendable stroller for carrying one or more passengers and transporting items, the stroller comprising:
- a front and a rear;
 - two or more stroller support members extending from the front to the rear;
 - a plurality of wheels attached to said two or more support members;
 - one or more seats attached to said two or more support members above said wheels;
 - a selectively extendable base member attached to at least one of said two or more support members; and
- an actuation mechanism operably connected to said extendable base member;
- whereby said extendable base member extends from a non-extended state to an extended state, and in which the extendable base member is extended upon selective operation of the actuation mechanism.
10. The stroller of claim 9, further comprising a selectively extendable rear handle connected to the extendable base member, wherein the actuation mechanism further comprises said telescopically selectively extendable rear handle to facilitate selective extension of the extendable base member.

11. The stroller of claim 9, wherein extension of the selectively extendable base member increases the distance from the front of the stroller to the rear of the stroller.
12. The stroller of claim 9, further comprising one or more cables that connect said selectively extendable rear handle to at least one of said one or more support members, wherein said actuation mechanism further comprises said one or more cables.
13. The stroller of claim 12, in which at least one of the one or more cables extends from said at least one of said one or more support members to said selectively expandable base member.
14. The stroller of claim 12, in which at least one of said one or more cables extends from said selectively extendable rear handle member to said selectively extendable base member. The stroller of claim 12, wherein said one or more cables describes one or more paths, and further comprising one or more locks along at least one of said one or more paths, wherein one or more of said one or more cables releases one or more of said one or more locks.
15. The stroller of claim 9, wherein said actuation mechanism further comprises a potential energy storage and release mechanism.

16. The stroller of claim 9 wherein the stroller additionally comprises a mechanism for selectively expanding and retracting the selectively extendable base member.

17. The stroller of claim 15, wherein one or more of said one or more locks comprises one or more locking positions.

18. The stroller of claim 10, wherein said selectively extendable rear handle member further comprises said actuator mechanism.

19. The stroller of claim 9, wherein said selectively extendable base member is optionally removable.

20. The stroller of claim 1 wherein one or more of the plurality of wheels are selectively detachable.

21. The stroller of claim 9, wherein one or more of the plurality of wheels are detachable.

22. A selectively collapsible and deployable stroller for carrying one or more passengers and transporting items, the stroller comprising:

a front and a rear;

two or more stroller support members extending from the front to the rear;

a plurality of wheels attached to said two or more support members;

one or more seats attached to said two or more support members above said wheels;

a selectively extendable base member attached to at least one of said two or more stroller support members; and

one or more additional support members coupled to one or more of said two or more stroller support members, whereby one or more of said one or more additional support members are deployed up extension of the selectively extendable base member.

23. A stroller in accordance with claim 22, wherein at least one of the two or more stroller support members is located toward the front of the stroller and at least one of the two or more stroller support members is located toward the rear of the stroller, and further wherein one or more of the one or more additional support members are coupled to said at least one front stroller support member and said at least one rear stroller support member .
24. A stroller in accordance with claim 23, in which said one or more additional support members is coupled to said front and rear stroller support members telescopically.
25. A stroller in accordance with claim 23, said one or more additional support members is coupled to said front and rear stroller support members slidably.
26. A stroller in accordance with claim 23, in which said one or more additional support members further comprise length, and wherein one or more of said one or more additional support members coupled to said front and rear stroller support members

are pivotably hinged at one or more location along said length of said one or more additional support members to facilitate selective collapse and deployment of said stroller .

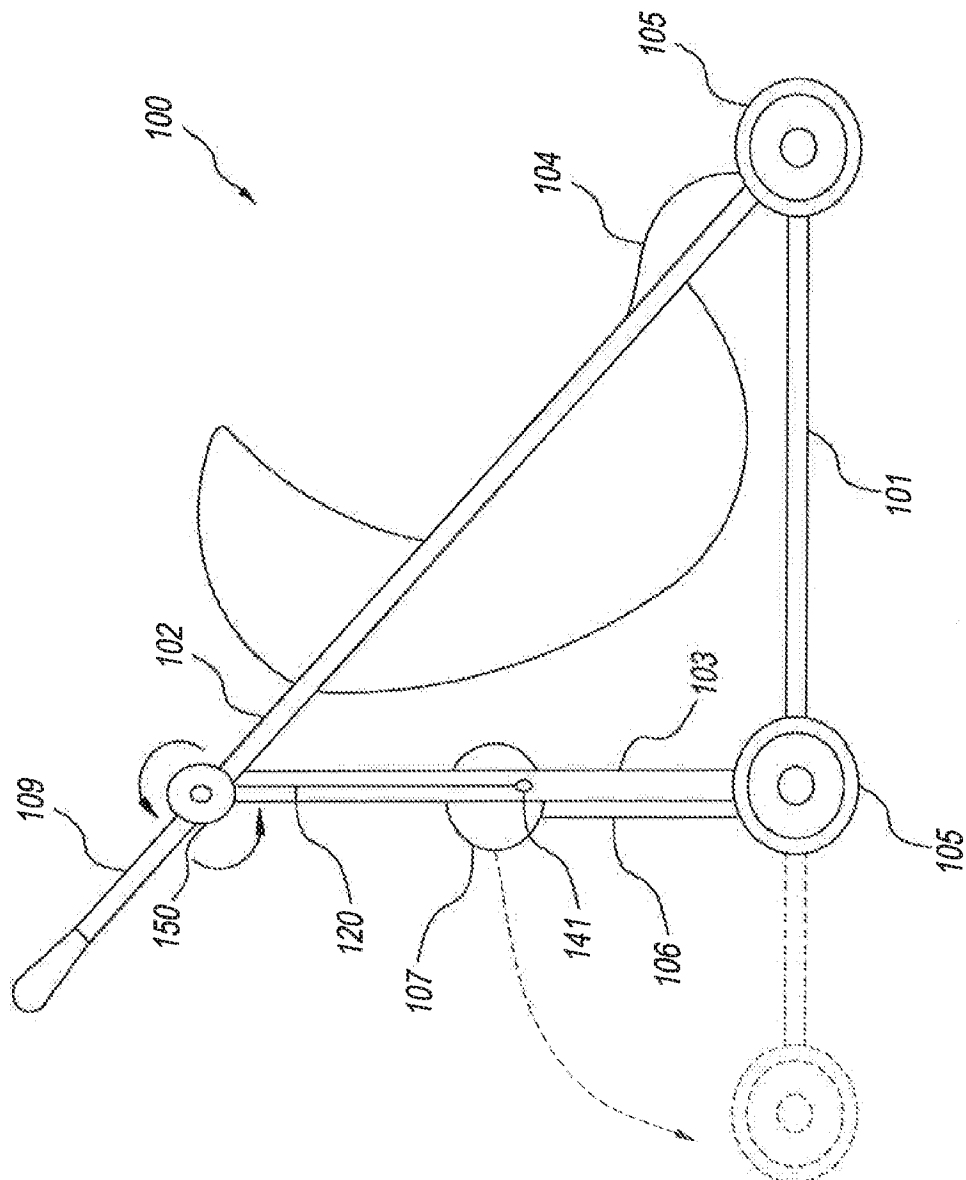
27. A stroller in accordance with claim 23, in which one or more of said one or more additional support members coupled to said front and rear stroller support members pivotably move from a substantially vertical position to a substantially horizontal position to facilitate selective collapse and deployment of said stroller .

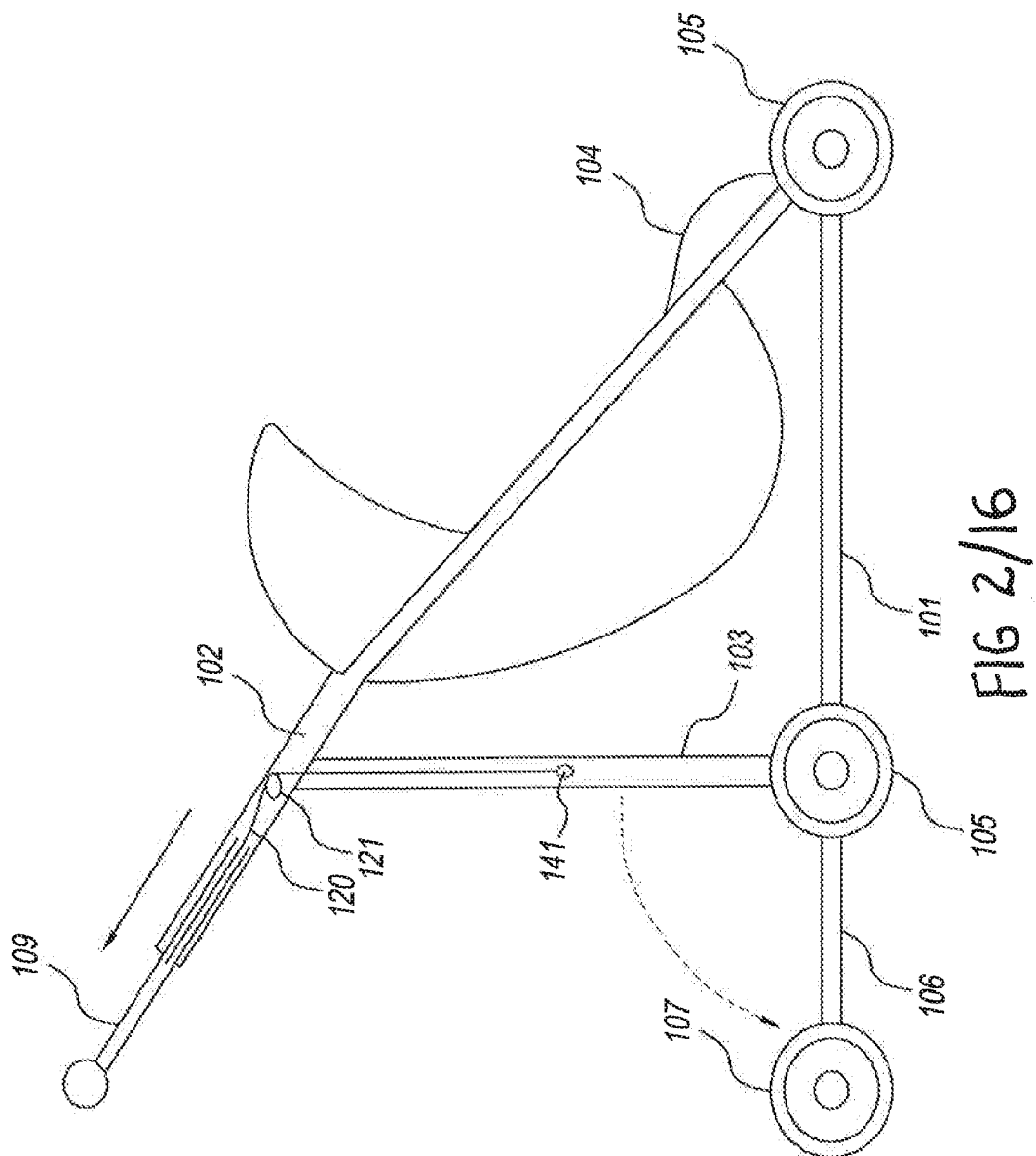
28. A stroller in accordance with claim 23, in which one or more of said one or more additional support members coupled to said front and rear stroller support members further comprise one or more locks to selectively fix one or more of said one or more additional support members in a selected position.

29. A stroller in accordance with claim 10, in which one or more of said one or more additional support members coupled to said front and rear stroller support members further comprise one or more selectively staged locks .

30. A stroller in accordance with claim 9, additionally comprising a sliding tray physically connecting the roughly parallel one or more selectively extendable base

members such that said sliding tray extends along with the one or more selectively extendable base members.


$$\frac{9}{16} \frac{1}{16}$$



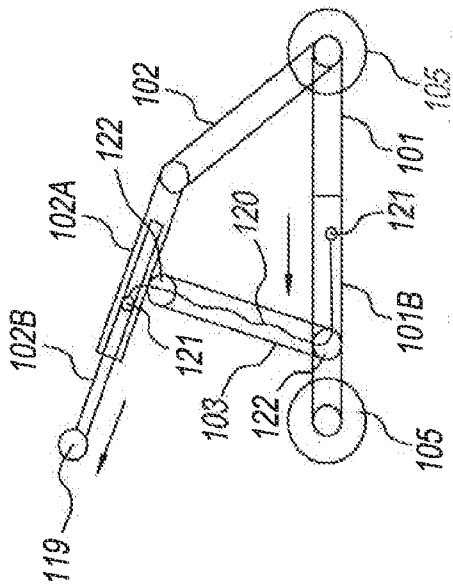


FIG 3B/16

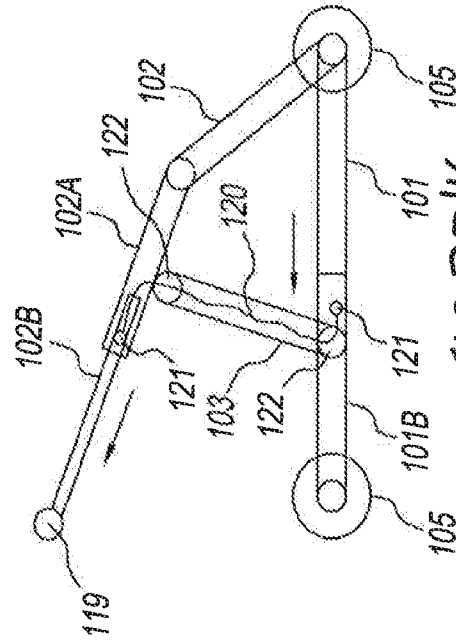


FIG 3D/16

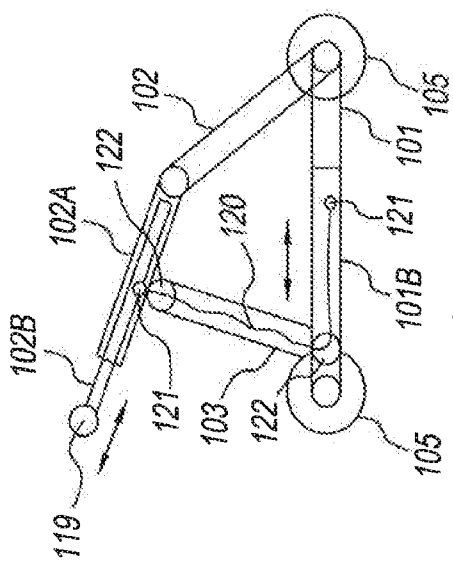


FIG 3A/16

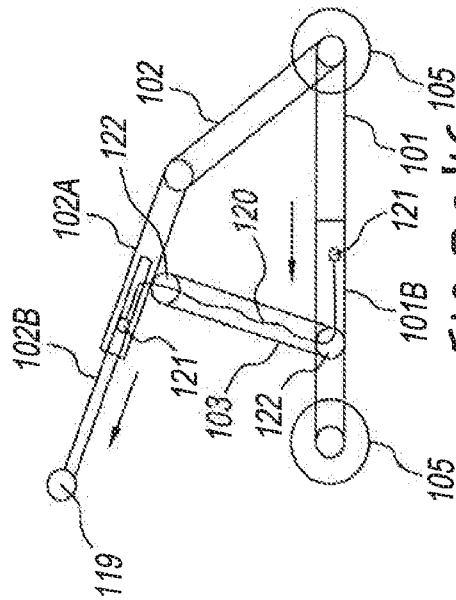


FIG 3C/16

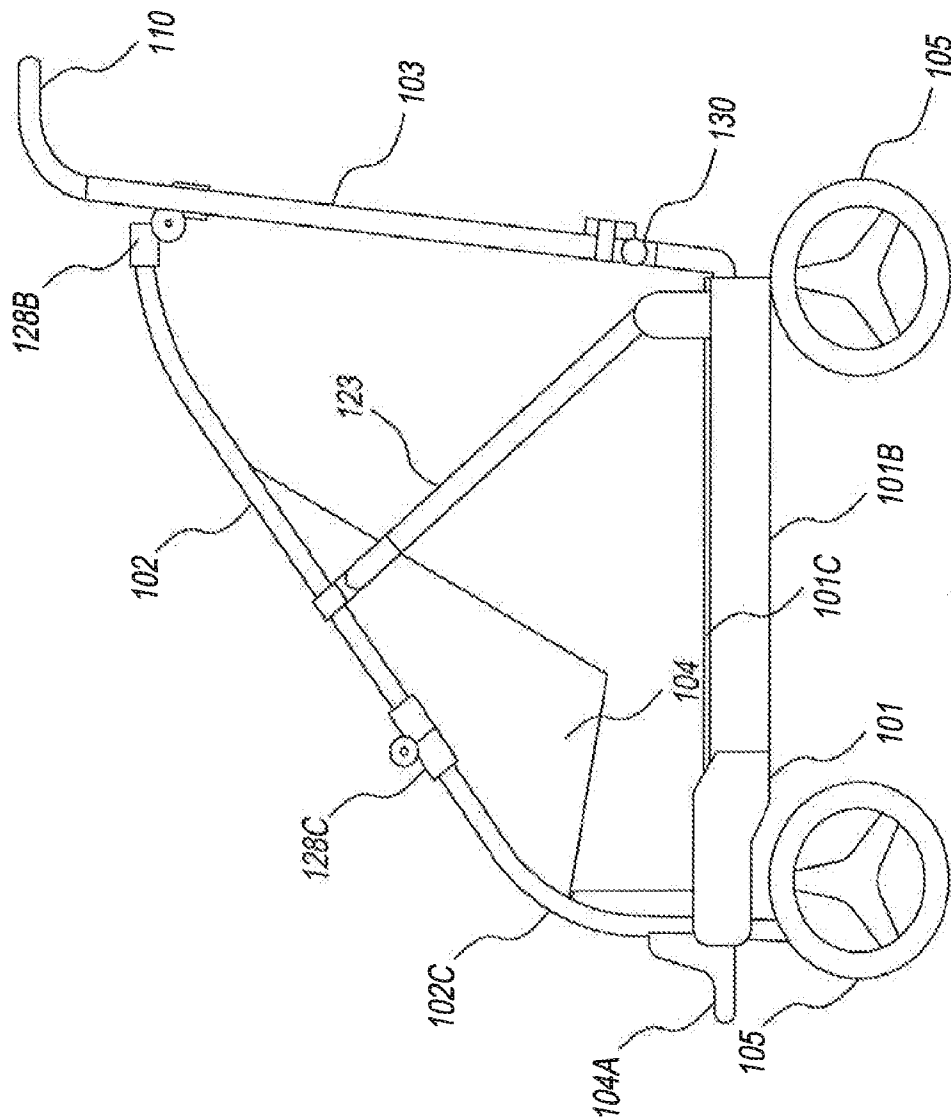


FIG 4/16

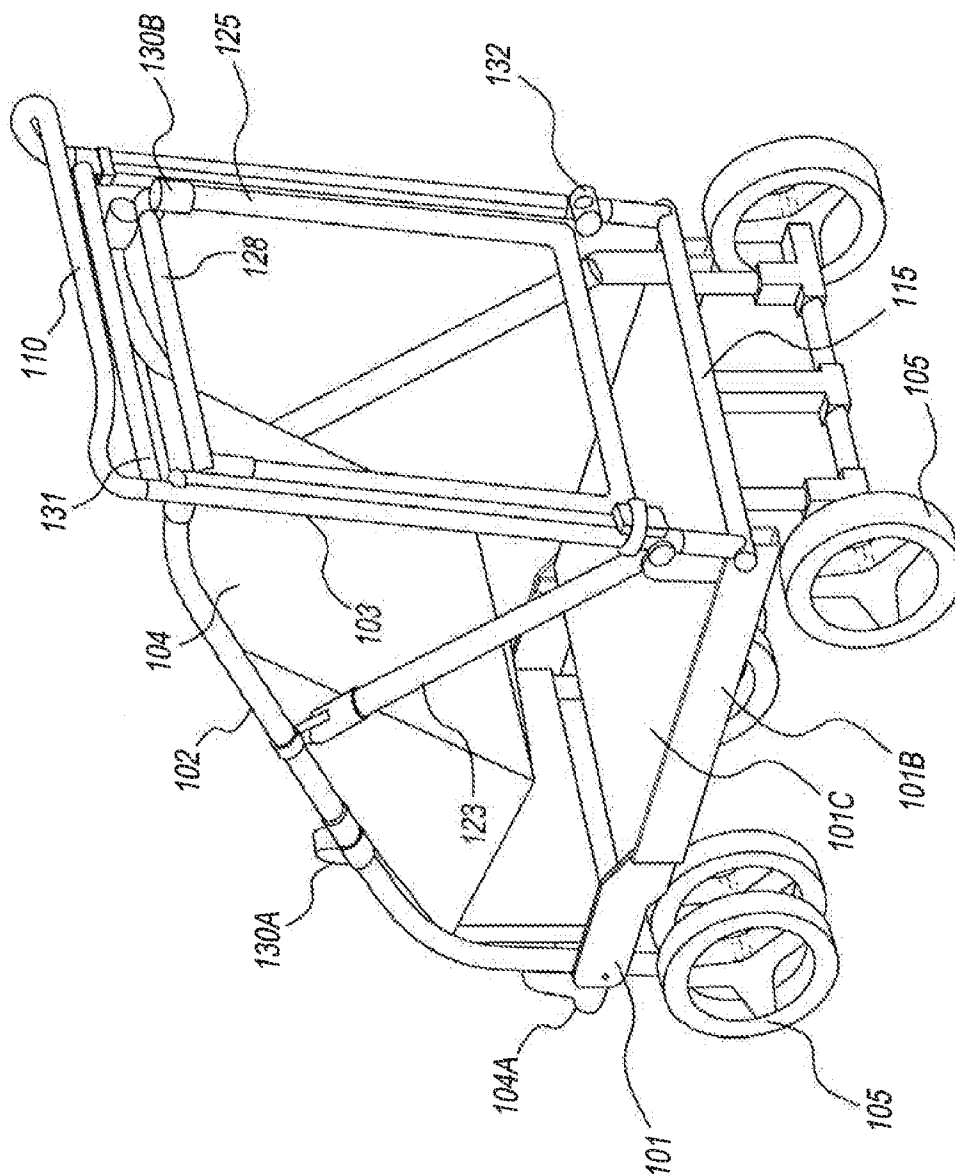


FIG 5/16

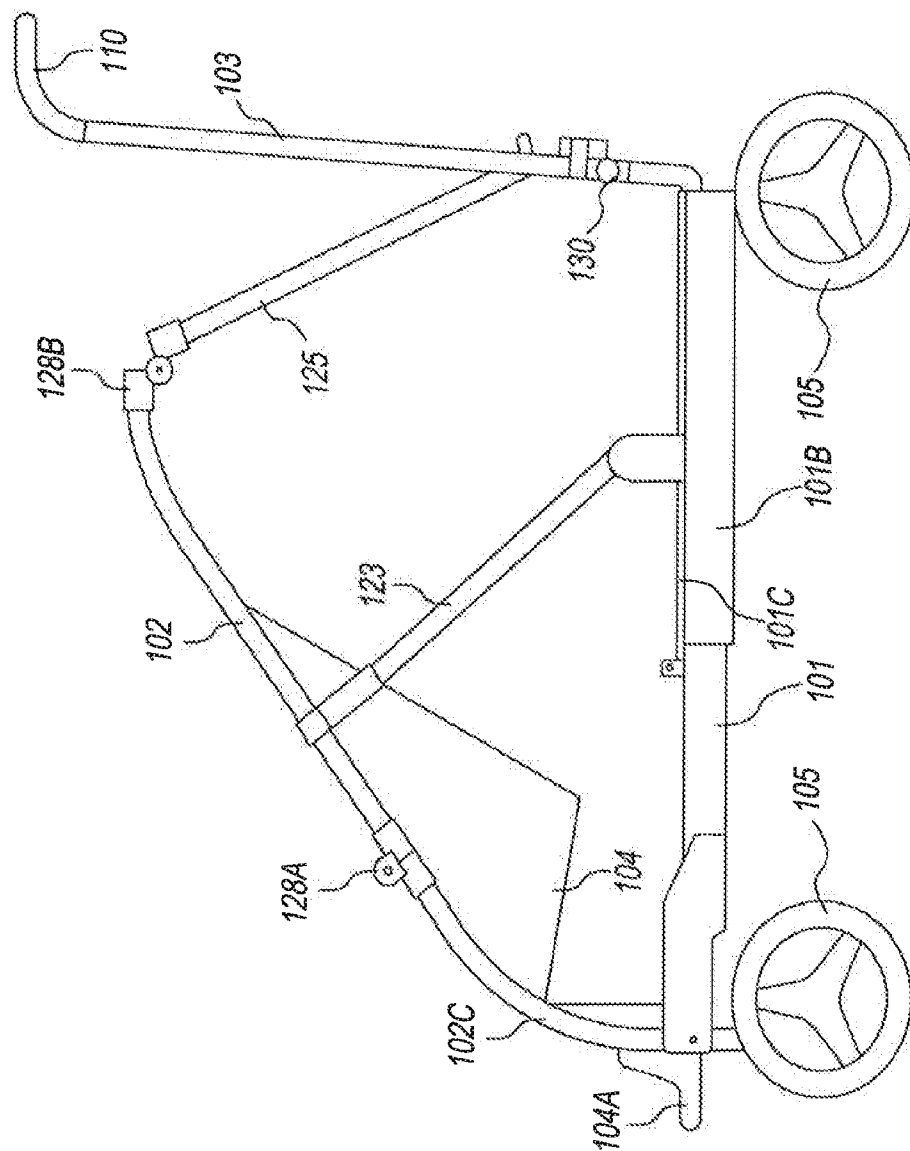
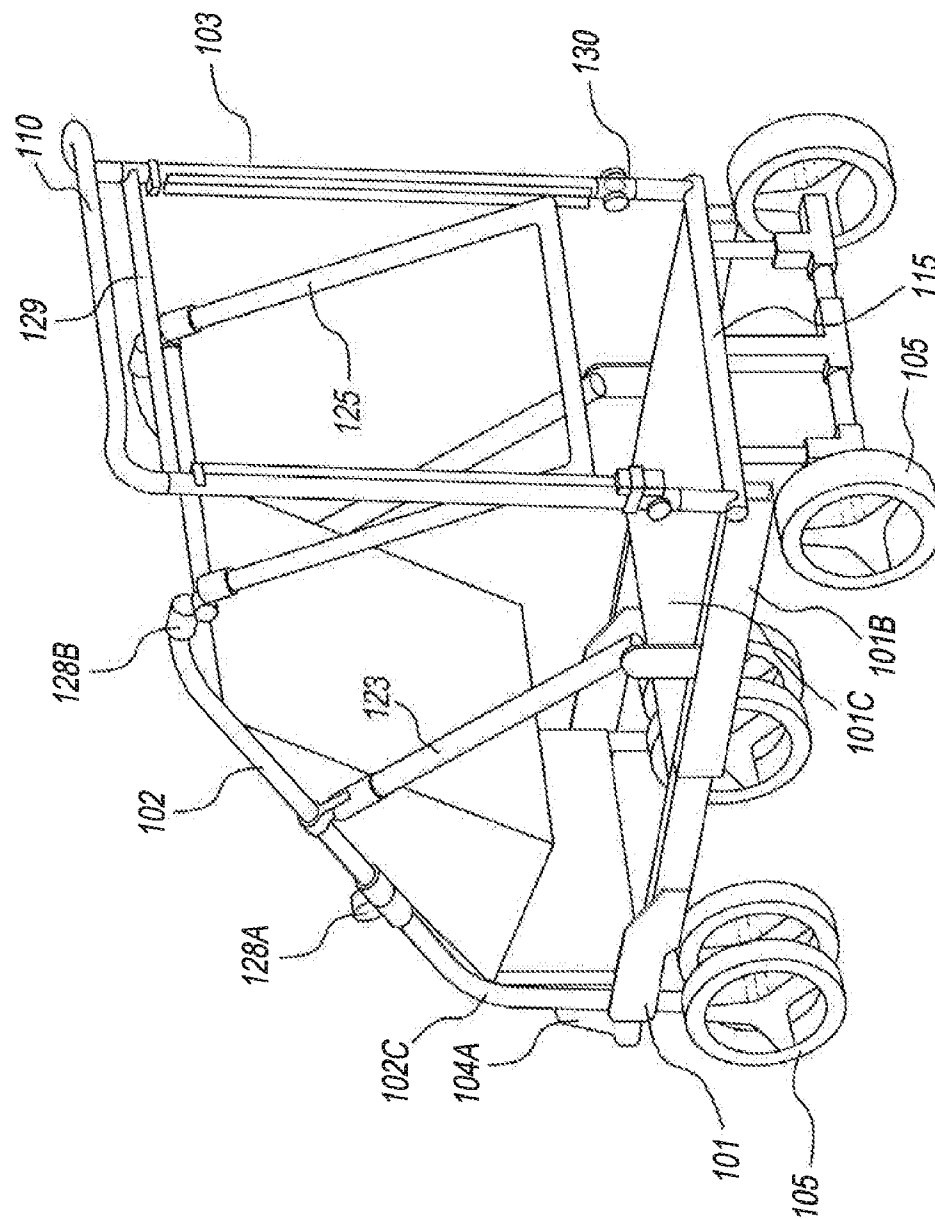


FIG 6|16



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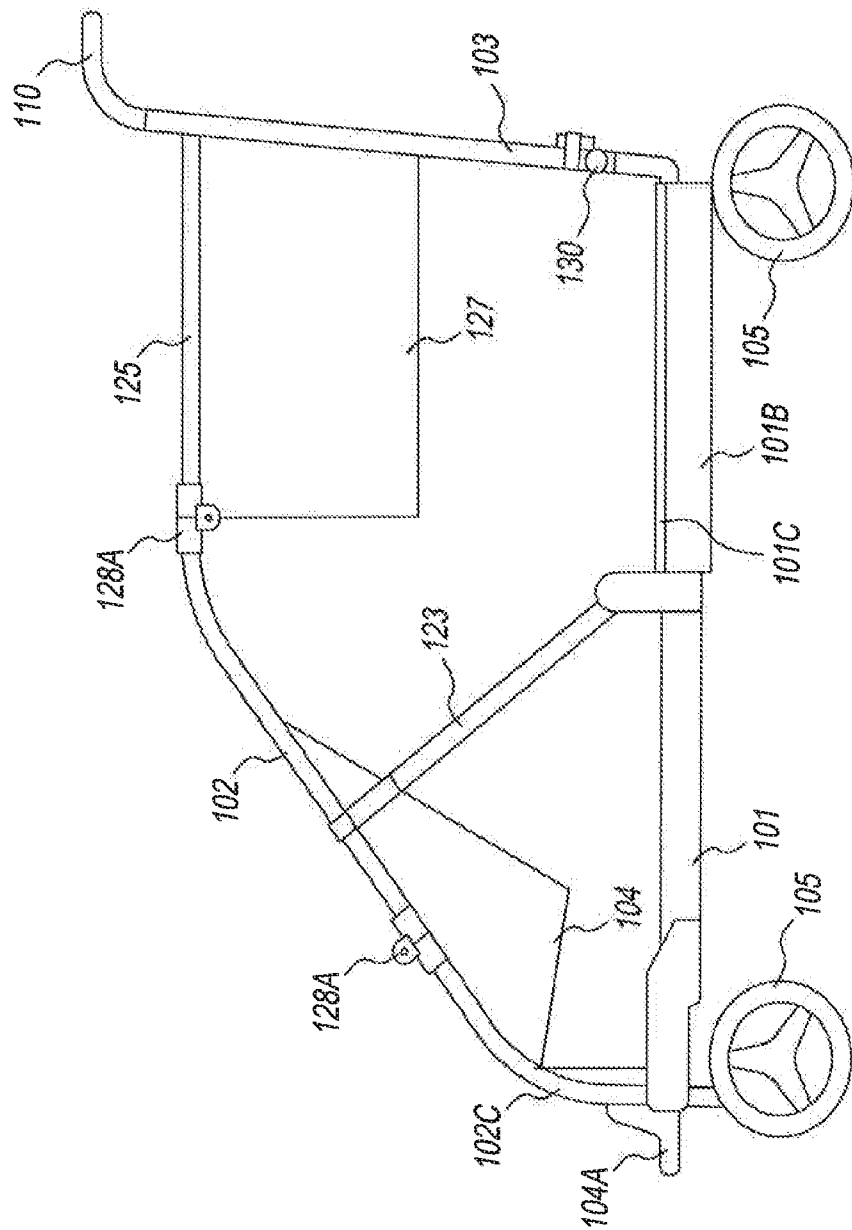


FIG 8|16

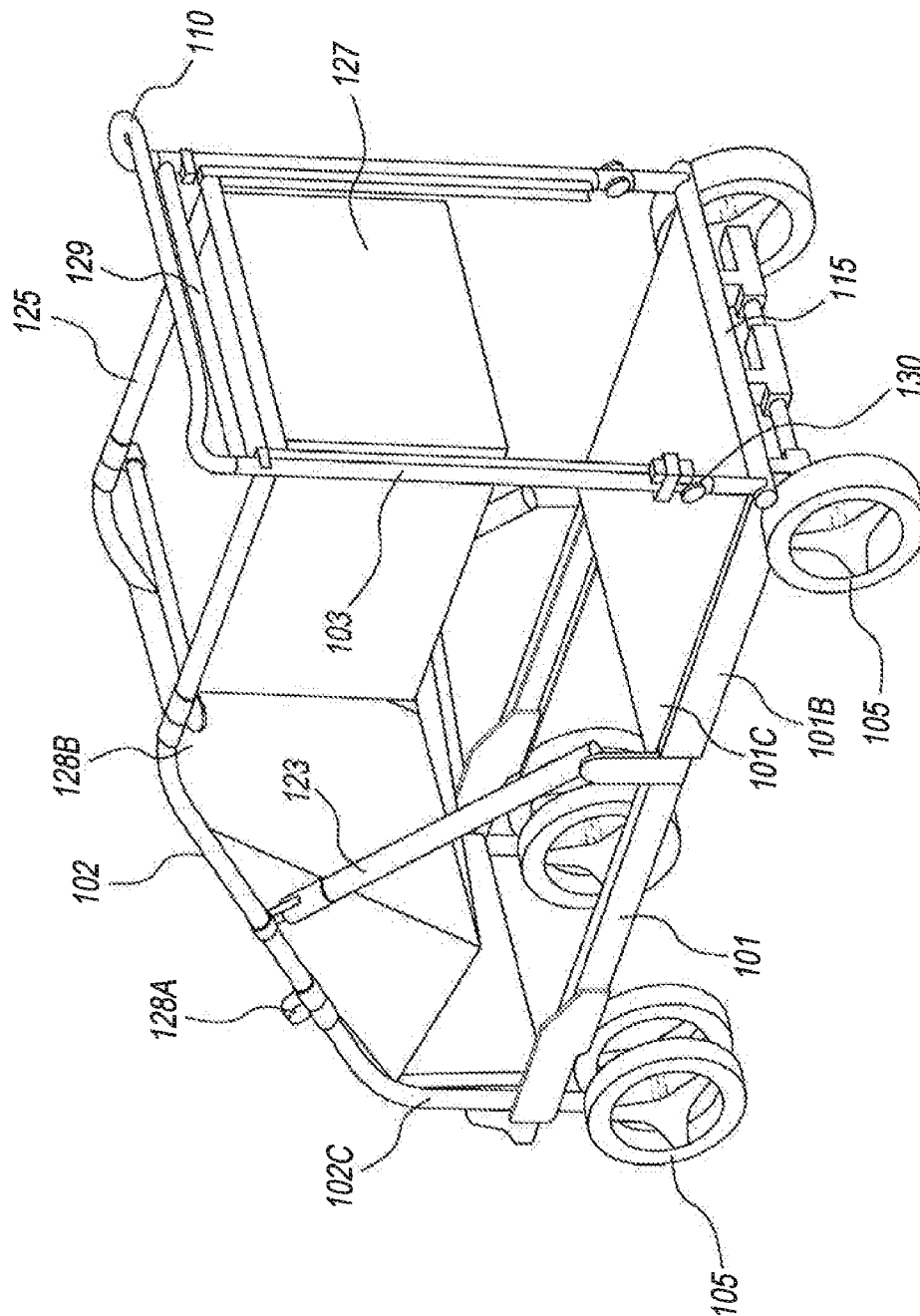


FIG 9/16

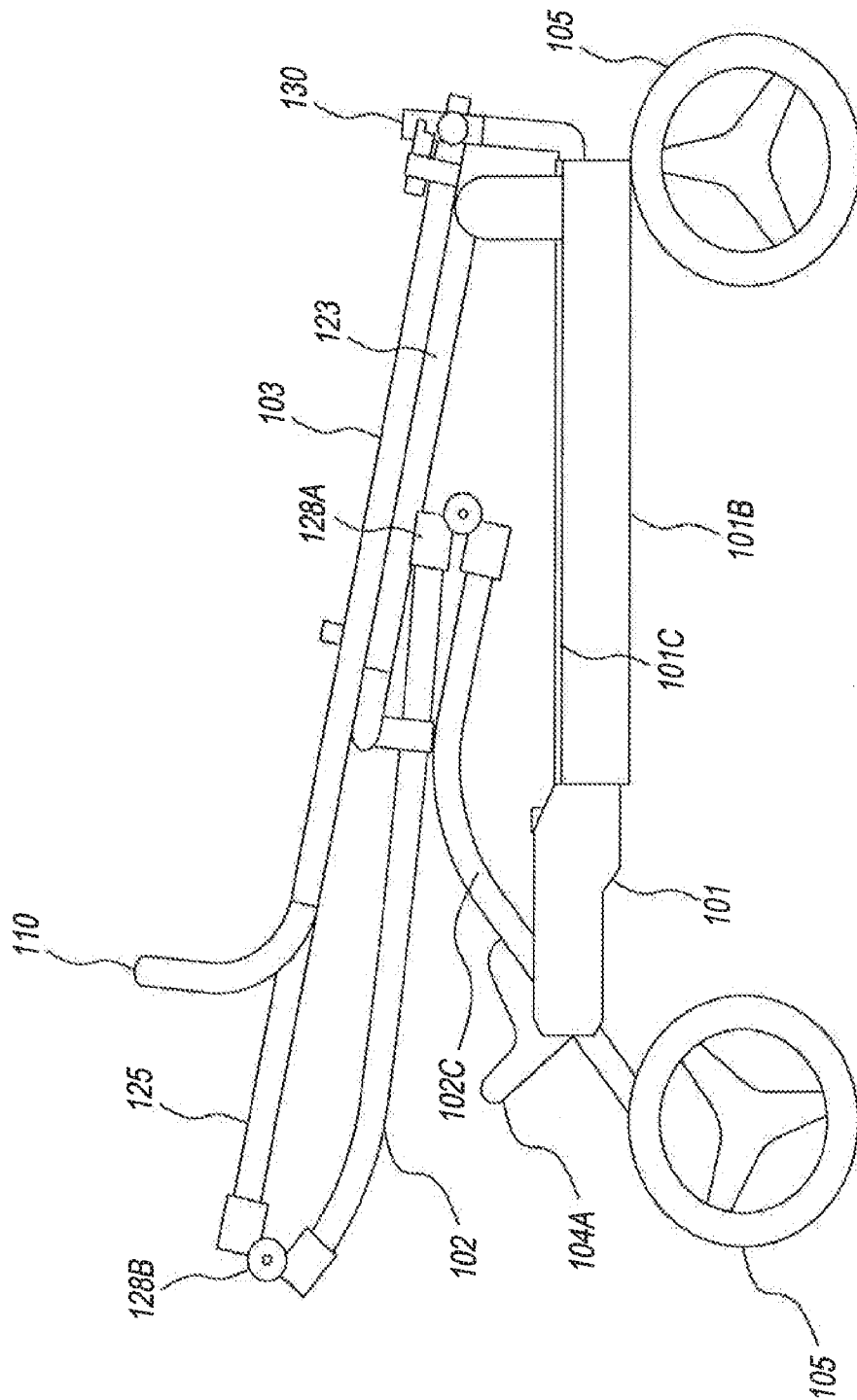
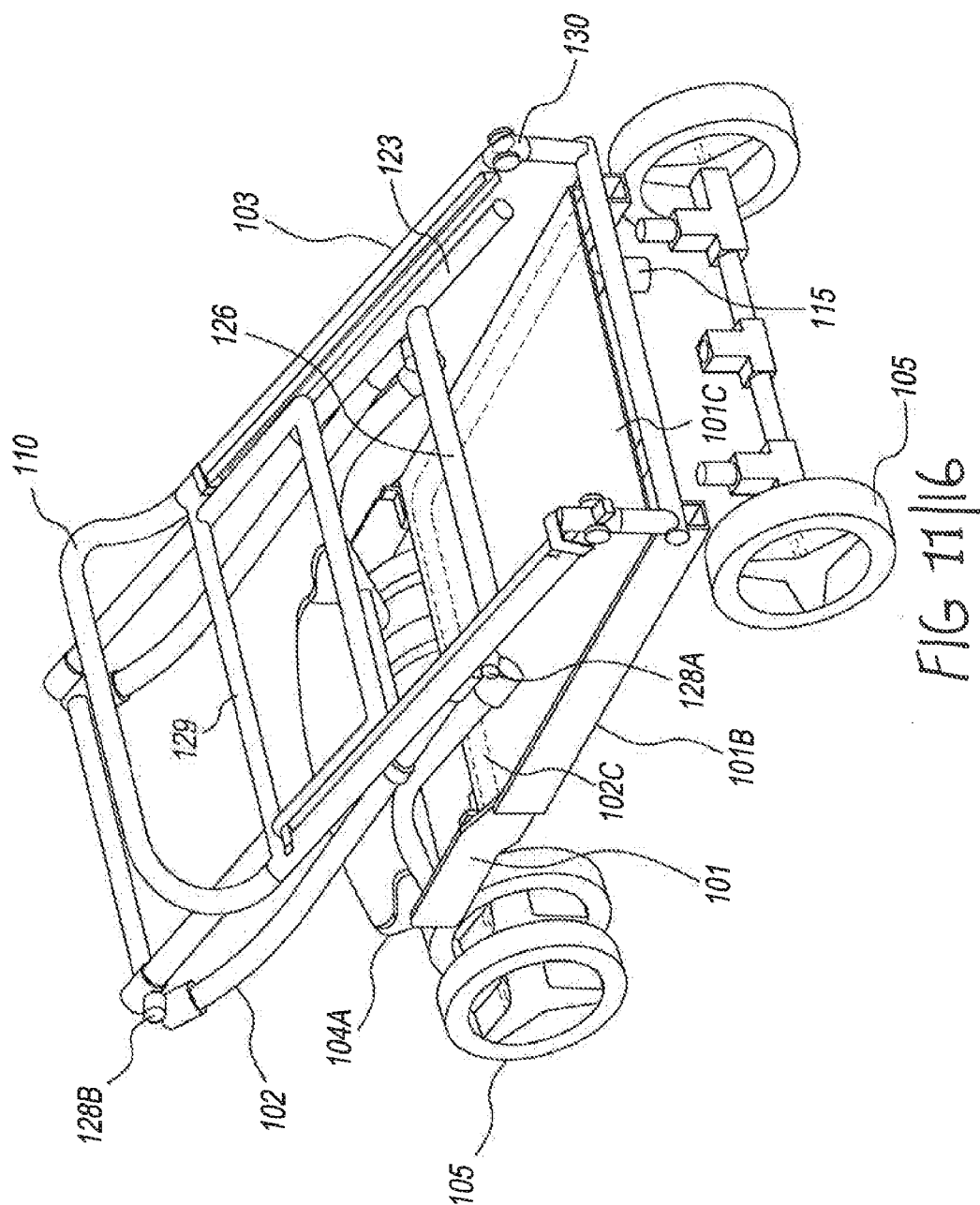


FIG 10/16



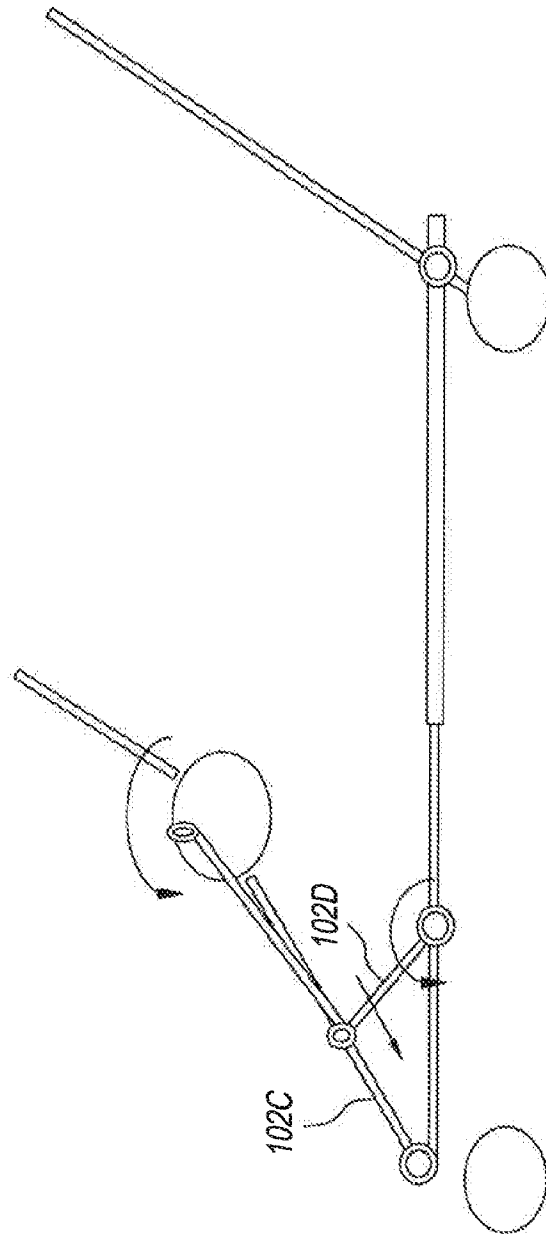


FIG 12/16

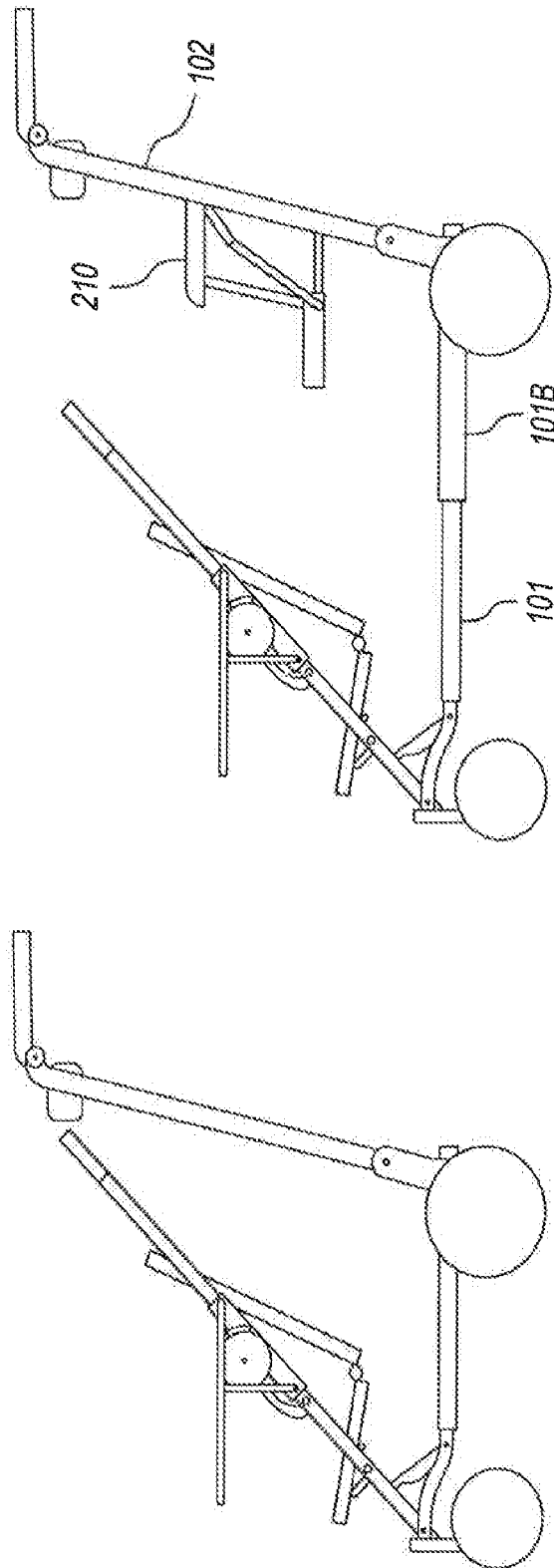
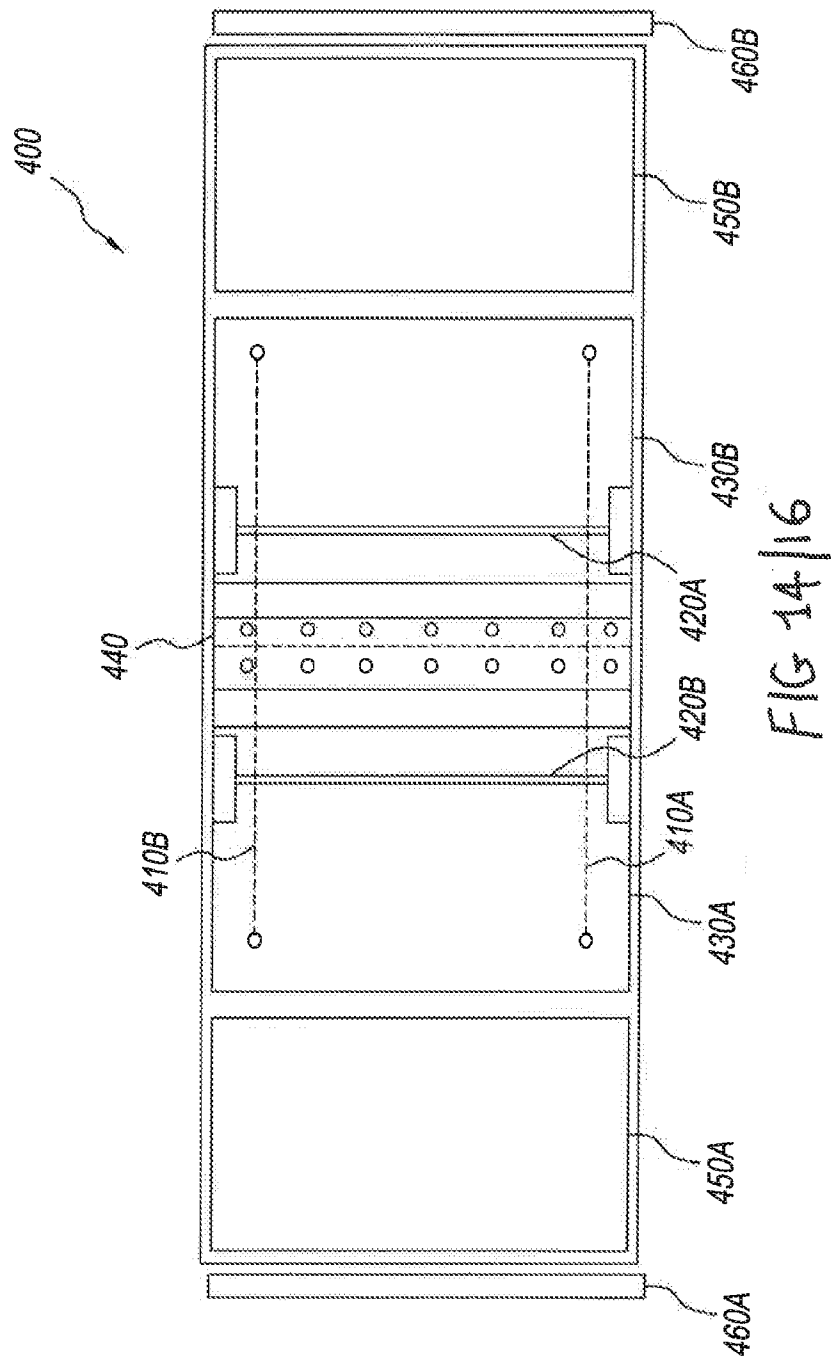
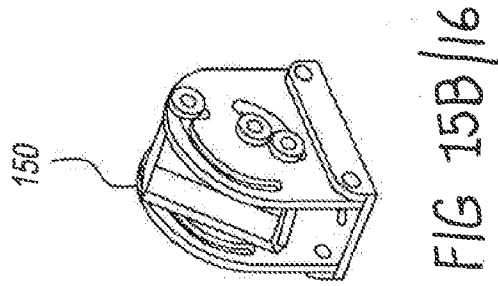
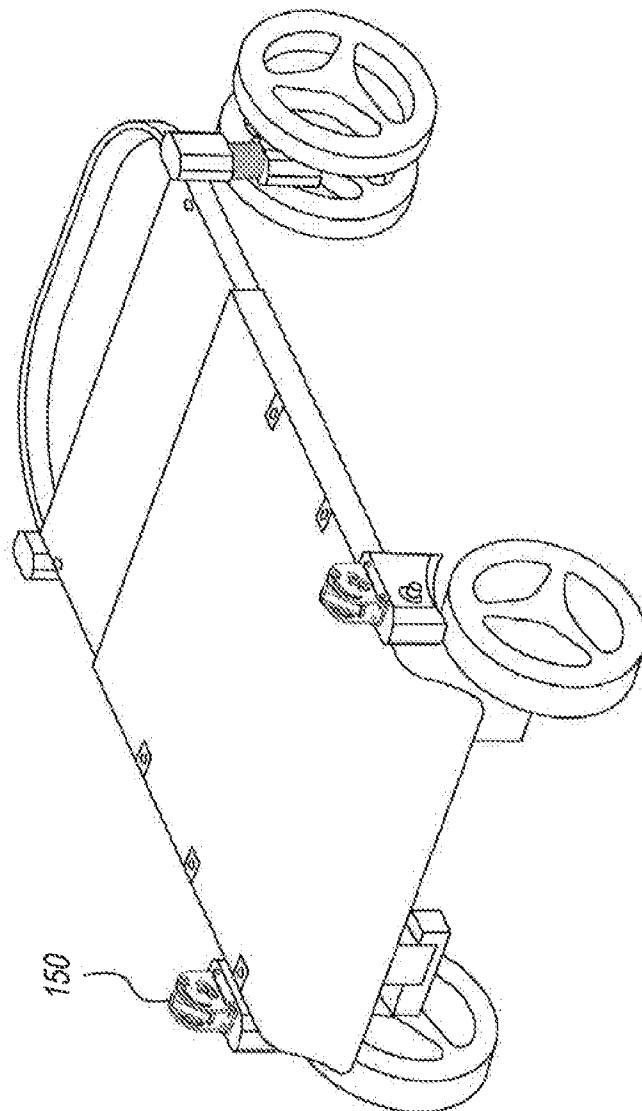


FIG 13/16





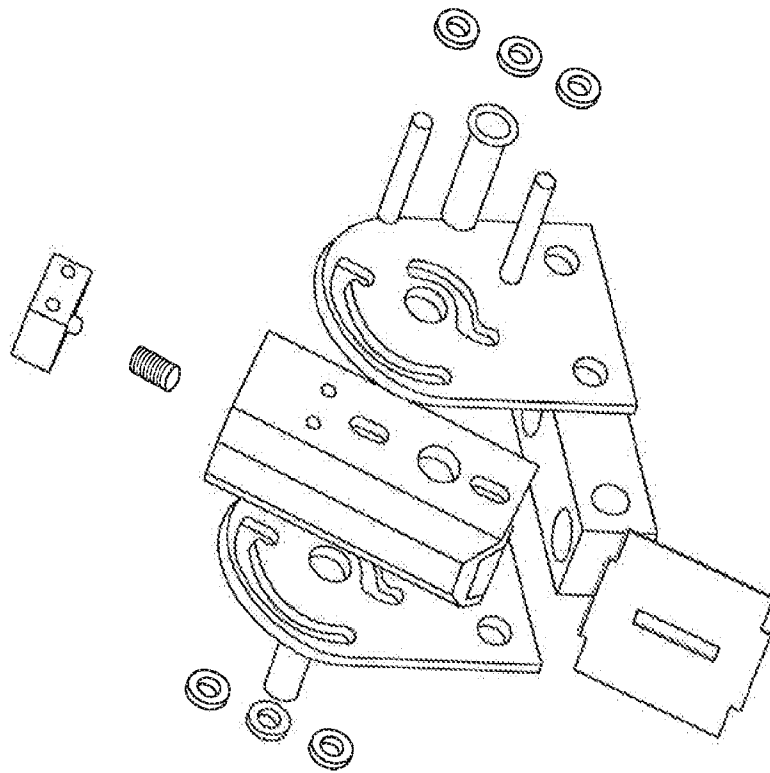


FIG 15C/16

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 14/41960

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B62B 7/06 (2014.01)

CPC - B62B 7/06

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)

IPC (8): B62B 7/06 (2014.01)

CPC: B62B 7/06

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

IPC(8): B62B 7/06 (2014.01) USPC: 280/38,639,641,642,647,650,655

CPC: B62B 7/06 (keyword limited; terms below)

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

PatBase; PubWEST (PGPB,USPT,USOC,EPAB,JPAB); Google (Patents,Scholar,Web) Search terms used: Stroller wheelchair support frame wheels seat pivotal base arm actuator stow collapse handle attach connect select detach releasable retractable pin extendable telescopic cables potential stored energy lock position removable slidable tray shelf mounted

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X — Y	US 4,832,354 A (LaFRENIERE) 23 May 1989 (23.05.1989), entire document, especially Fig 1-5; col 1, ln 5-8; col 3, ln 44-47; col 3, ln 66 to col 4, ln 10; col 4, ln 12-15, ln 25-29, ln 37-40, ln 48-50, ln 54-57; col 5, ln 12-18, ln 54-65; col 6, ln 54-55	1-4,6,9-11,16,18 ----- 5, 7-8,15,17,19-21,29
X — Y	US 7,758,063 B2 (JOHNSON et al.) 20 July 2010 (20.07.2010), entire document, especially Fig 1-6, 10-13, 16; col 1, ln 35-37, ln 49-50; col 6, ln 1-2, ln 5-9, ln 18-20; col 7, ln 26-28, ln 60-62; col 8, ln 56-58, ln 61-64; col 10, ln 7-9; col 11, ln 60-67; col 12, ln 55-63	9,11,22-26,30 ----- 12-14,28
X	US 5,011,175 A (NICHOLSON et al.) 30 April 1991 (30.04.1991), entire document, especially Fig 1-3; col 1, ln 53-55; col 2, ln 38-48; col 3, ln 26-27, ln 32-37, ln 40-48, ln 54-58; col 4, ln 27-36; col 5, ln 40-41, ln 46-47	22,23,27
Y	US 7,523,954 B2 (DOTSEY et al.) 28 April 2009 (28.04.2009), Fig 12; col 11, ln 58-61; col 18, ln 66-67; col 19, ln 14-15, ln 48-49, ln 51-52	5,15,17
Y	US 5,562,300 A (NELSON) 08 October 1996 (08.10.1996), Fig 1-6; col 5, ln 50 to col 6, ln 5	7,20,21
Y	US 4,643,446 A (MURPHY et al.) 17 February 1987 (17.02.1987), col 2, ln 15-19, ln 32-40, ln 45-52	8,19
Y	US 6,565,112 B2 (HANSON et al.) 20 May 2003 (20.05.2003), col 17, ln 15-29, ln 48-53; col 19, ln 19-31	12-14,28-29
A	US 8,029,007 B2 (JONES et al.) 04 October 2011 (04.10.2011), entire document	1-30



Further documents are listed in the continuation of Box C.



* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“E” earlier application or patent but published on or after the international filing date

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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

19 September 2014 (19.09.2014)

Date of mailing of the international search report

17 OCT 2014

Name and mailing address of the ISA/US

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