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(54) STROLLER WITH PASSIVE RESTRAINT ARRANGEMENT

(75) Inventors: **Devon Siesholtz**, Boyertown, PA (US); **Andrew Bowman**, Chester Springs, PA (US)

Correspondence Address:
LEMPIA FORMAN LLC
223 W. JACKSON BLVD.
SUITE 620
CHICAGO, IL 60606 (US)

(73) Assignee: **Graco Children's Products Inc.**, Exton, PA (US)

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(57) **ABSTRACT**

A stroller has at least one seat supported by a frame assembly. The seat has a seat back and a seat bottom. A traversing structure extends laterally across the seat, is spaced forward of a surface of the seat back, and is spaced upward of a surface of the seat bottom. A foot opening is positioned beneath the traversing structure, above the seat bottom, and between opposed and spaced apart side frame sections of the frame assembly. A passive restraint obstruction extends from a portion of the stroller into the foot opening and reduces a size of the foot opening. The obstruction creates a passive restraint to inhibit a child from fitting through the foot opening.

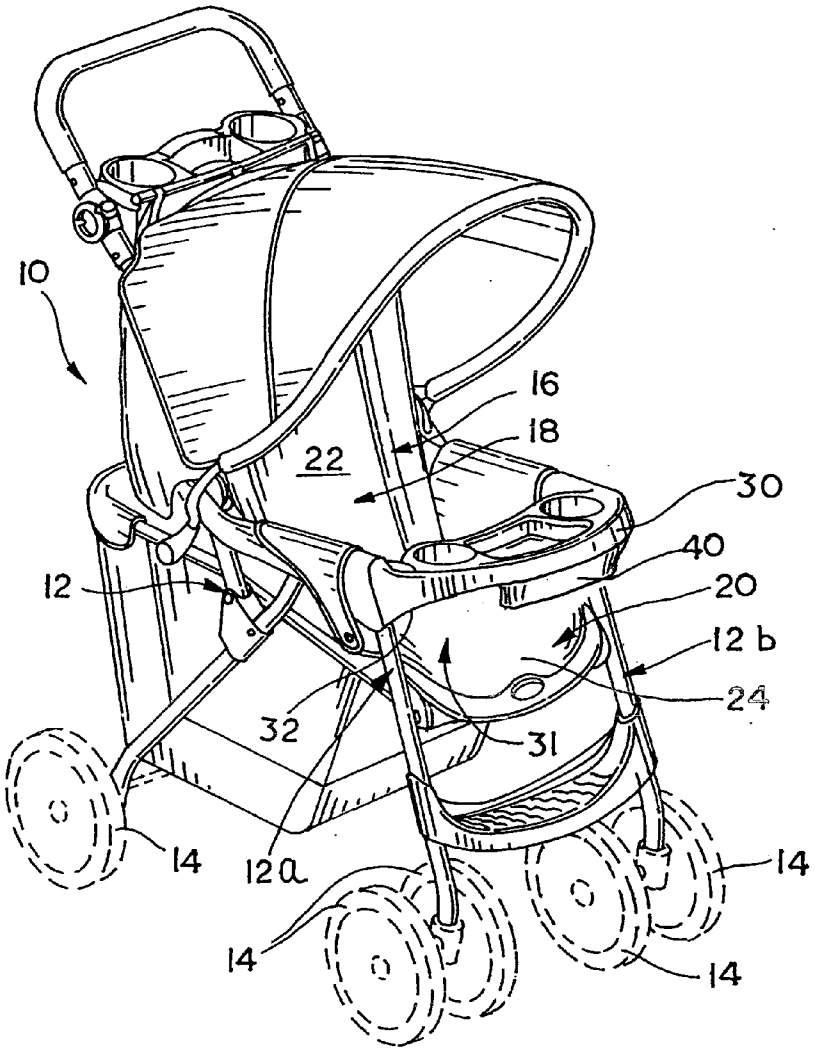
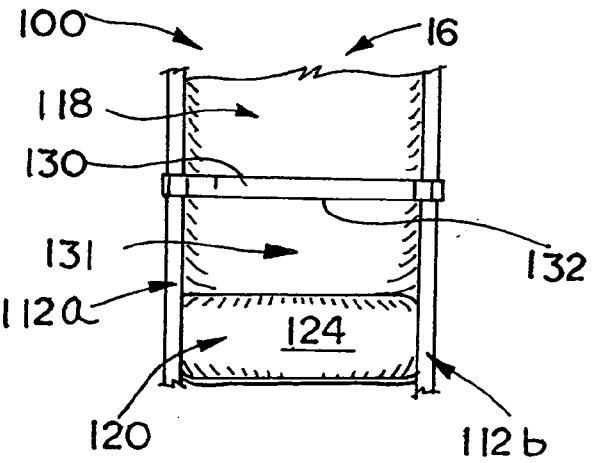


FIG 2
PRIOR ART



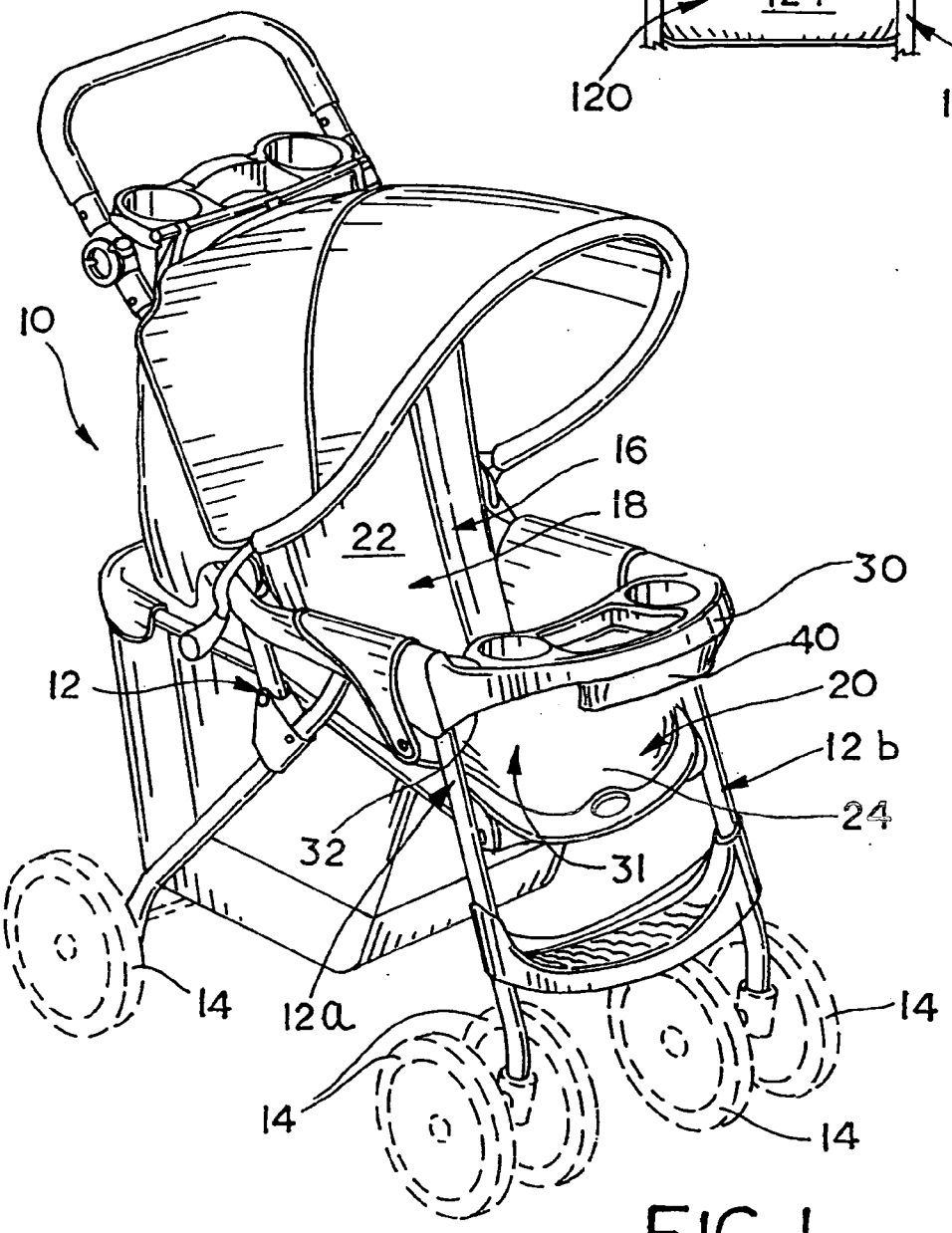


FIG. 1

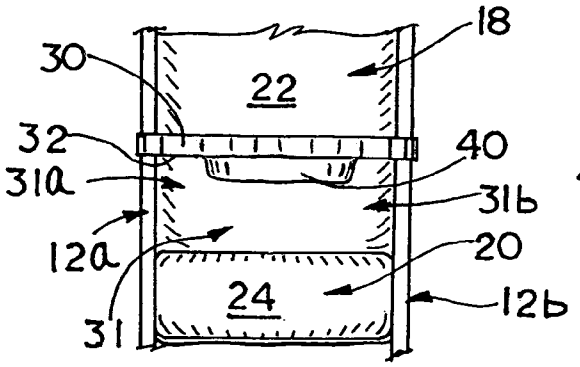


FIG.3A

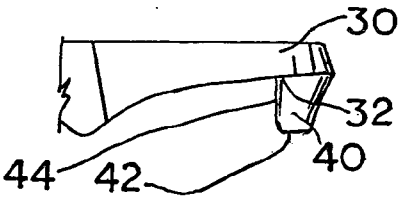


FIG.3B

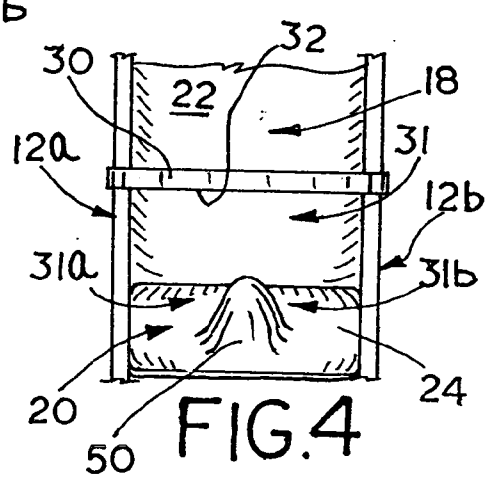


FIG.4

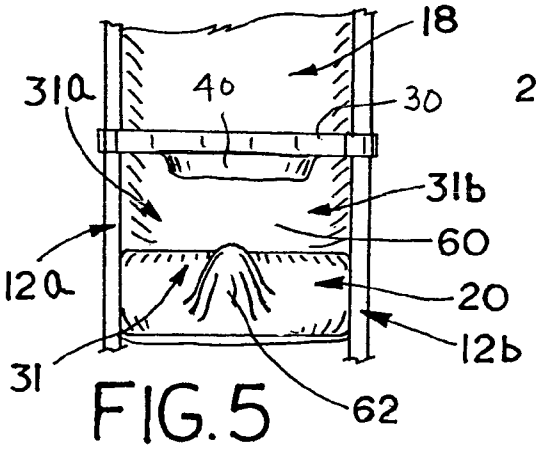


FIG.5

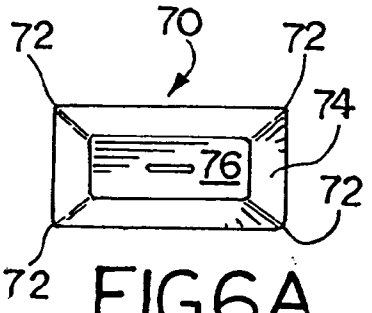


FIG.6A

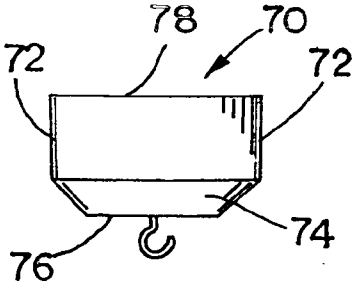


FIG.6B

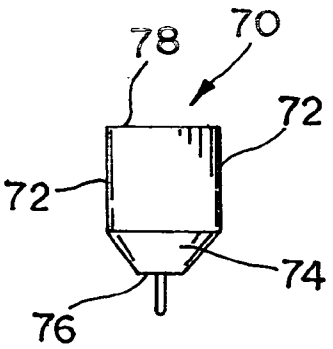


FIG.6C

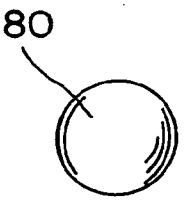


FIG.7

STROLLER WITH PASSIVE RESTRAINT ARRANGEMENT

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Disclosure

[0002] The present invention is directed to strollers, and more particularly to a stroller with a seating arrangement that provides a passive restraint feature for an occupant.

[0003] 2. Description of Related Art

[0004] Strollers are well known in the art to include a seat with a seat bottom and a seat back. Such strollers are also well known to optionally include a tray, grab bar, or other structure that traverses laterally across the stroller seat. Such a tray or other structure is typically positioned above the seat bottom and forward of the seat back s that an occupant sits behind the structure and their legs extend forward beneath the structure.

[0005] In a typical stroller, both the front edge region of the seat bottom and the underside of the tray or other traversing structure have a relatively linear profile laterally across the width of the stroller. This creates a fairly consistent vertical gap between the underside of the traversing structure and the top side of the seat bottom near its forward edge.

[0006] Stroller seats are typically provided with a safety belt or harness for the purpose of restraining a child or infant in the seat. However, a child that is not properly restrained by the belt or harness can slide forward in the seat between the forward edge of the seat bottom and the underside of the traversing structure. A child can fall completely out of the stroller seat or become trapped part way forward in the seat, between the seat bottom and the tray or other structure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Objects, features, and advantages of the present invention will become apparent upon reading the following description in conjunction with the drawing figures, in which:

[0008] FIG. **1** is a perspective view of one example of a stroller constructed in accordance with the teachings of the present invention.

[0009] FIG. **2** is a schematic front view of the vertical gap between the seat bottom and the traversing structure in a prior art stroller.

[0010] FIGS. **3**A and **3**B are schematic front and side views, respectively, of one example of a passive restraint configuration between the seat bottom and the traversing structure, as shown in the stroller of FIG. **1**.

[0011] FIG. **4** is a schematic front view of one alternative example of a passive restraint configuration between the seat bottom and the traversing structure suitable for the stroller shown in FIG. **1**.

[0012] FIG. **5** is a schematic front view of another alternative example of a passive restraint configuration between the seat bottom and the traversing structure suitable for the stroller shown in FIG. **1**.

[0013] FIGS. **6**A-**6**C are several views of a torso probe used during stroller compliance testing.

[0014] FIG. **7** is a view of a head probe used during stroller compliance testing.

DETAILED DESCRIPTION OF THE DISCLOSURE

[0015] The strollers disclosed herein resolve or improve upon one or more of the problems noted above with previously known strollers. The disclosed strollers have a passive restraint configuration between a stroller seat bottom and a tray or other structure that laterally traverses the stroller above the seat bottom. The passive restraint configuration inhibits unintentional, forward pass-through of a child or infant between the seat bottom and the tray or other structure.

[0016] Turning now to the drawings, FIG. **1** is a perspective view of one example of a stroller **10** constructed in accordance with the teachings of the present invention. The stroller **10** is disclosed for the most part with well known representative components that are not described in detail herein. For the purposes of later description, the stroller **10** generally has a frame assembly **12** supported on a ground surface by a plurality of wheels **14**. In this example, the frame **12** has a pair of spaced apart side sections **12**A and **12**B that are coupled to one another by cross member, link, or other interconnecting structures. Many strollers are known to have frame structures that are collapsible so that the stroller can be reconfigured between a set up condition for use, as depicted in FIG. **1**, and a collapsed condition (not shown). Many strollers are also known to have only a single seat as shown, suitable for one occupant. Some other strollers are known to have more than one seat to accommodate multiple occupants, whether in a stadium seating arrangement, a side-by-side seating configuration, a dual front and rear facing seating arrangement, or the like. Nearly all strollers have at least one seat that faces forward and that is positioned at a forward end of the stroller. The disclosed invention is equally suitable for many different types of strollers, including those that have at least one forward facing, front positioned seat.

[0017] The stroller **10** in the example of FIG. **1** has a single seat **16** for carrying a single occupant. The seat **16** has a generally forward facing seat back **18** and a generally upward facing seat bottom **20**, though the seat back and bottom can be inclined relative to respective vertical and horizontal reference planes. The forward exposed surface **22** of the seat back **18** and the upward exposed surface **24** of the seat bottom together create a seating surface against which an infant or toddler would lie when sitting in the stroller. The seat **16** is positioned between the frame side sections **12**A and **12**B and is suspended or supported in an in-use position by the frame assembly.

[0018] Many strollers are provided with a traversing structure of some type that extends laterally side-to-side between the two frame side sections **12**A and **12**B. The configuration and purpose of the traversing structure can vary. The structure can be a simple planar surface, a tray with one or more recesses, a grab bar, or the like. In this example, the traversing structure is shown as a tray **30**. The tray **30** is mounted to portions of the opposed frame side sections **12**A and **12**B and traverses the between the frame sections above the seat bottom and forward of the seat back. The tray **30** can be secured to the frame structure in any suitable manner at

its opposed ends and can be fixed to, and optionally removably detachable from, the stroller. With the tray **30** or other structure in place, a foot opening or space **31** is created above the surface **24** of the seat bottom **20** and beneath the underside **32** of the tray **30**.

[**0019**] FIG. **2** illustrates a schematic front view of a conventional or prior art stroller **100**. The conventional stroller **100** in this example is shown having opposed, spaced apart frame side sections **112**A and **112**B, a seat back **118** and seat bottom **120** positioned between the frame side sections, an upward facing seat bottom surface **124**, and a tray **130** with an underside **132**. A width of a foot opening or vertical gap **131** is created between the frame side sections **112**A and **112**B. A height of the foot opening **131** is defined between the tray underside **132** and the seat bottom surface **124**. In the conventional stroller depicted in FIG. **2**, the underside **132** of the tray **130** has a somewhat or generally linear lateral profile, as does the forward edge of the seat bottom surface **124**. Thus, the vertical gap or height of the foot opening between the underside of the tray and the upward facing surface of the seat bottom is relatively consistent across the stroller width. As noted previously, when a child is resting unrestrained in the seat of this stroller **100**, the child is at risk of sliding forward beneath the tray **130**.

[**0020**] FIGS. **3-5** illustrate three of many possible alternative examples of seat and tray configurations that can be utilized to create a passive restraint feature for a stroller. The passive restraint is configured so that a child can not slide or pass unintentionally through the foot opening **31** between the tray **30** and the seat bottom **20**. In each example, an obstruction is positioned within the foot opening **31** to inhibit a child from fitting, and thus unintentionally sliding, between the tray **30** and seat bottom **20**.

[**0021**] FIGS. **1**, **3**A, and **3**B show one example of such a passive restraint configuration. In this example, the underside **32** of the tray **30** does not have a linear profile. Instead, the underside **32** includes a downward projecting obstruction **40** carried by the tray **30**. The obstruction **40** in this example has a smoothly curved lower end **42** and a gradually tapering width, becoming narrower moving away from the tray underside **32**. The obstruction **40** can vary in configuration and construction and yet fall within the spirit and scope of the present invention. In one example, the obstruction can also have a tapered or changing height dimension over its length, though not shown herein. The rear end **44** as shown and that faces a seat occupant can have the largest obstruction dimension. The obstruction **40** can be sized and configured to prevent a part of the child's body from becoming wedged between the lower end **42** of the obstruction and the seat bottom **20**. The obstruction surfaces can be shaped and contoured so as to avoid sharp edges and to prevent injury to an occupant of the stroller seat, should the occupant slide into contact with the obstruction **40**.

[**0022**] The purpose of the obstruction **40** in this example is to reduce the size of any part of the foot opening **31** and/or alter the configuration of the foot opening **31** to create a passive restraint. That is, the obstruction **40** would be sized and positioned so that no part of the foot opening will be large enough to permit a child's body or head to pass or "submarine" between any part of the tray underside **32** and the upward facing surface **24** of the seat bottom **20**. Testing and/or regulatory standards may be utilized to determine the precise configuration for the obstruction **40**. However, the height and/or width of the taller foot opening regions **31**A and **31**B on either side of the obstruction **40** are to be sufficiently small in this example to provide the passive restraint function.

[**0023**] FIG. **4** shows another example of a passive restraint configuration. In this example, an obstruction **50** projects upward from the upward facing surface **24** of the seat bottom **20**. Again, the obstruction **50** can be configured with a smooth contoured, tapered exterior surface, and with particular shapes to enhance comfort of the user while still performing the intended passive restrain function. The obstruction **50** in this example again creates taller regions **31**A and **31**B on either side of the obstruction **50** within the foot opening **31**. Each of these regions in this example should be sufficiently sized and shaped so as to inhibit a child's torso or head from passing between the tray **30** and the seat bottom **20**.

[**0024**] FIG. **5** shows yet another example of a passive restraint configuration. In this example, an obstruction within the foot opening **31** is created by a combination of a depending obstruction **60** carried by the underside **32** of the tray **30** and an upward protruding obstruction **62** carried by the seat bottom **20**. The combined effect of the obstructions **60** and **62** reshapes the foot opening **31** so that any region of the foot opening **31** is sufficiently small to inhibit a child's torso or head from passing between the tray **30** and the seat bottom **20**. Each of the obstructions can be varied significantly and yet sized and configured in combination for user comfort and overall passive restraint performance.

[**0025**] As will be evident to those having ordinary skill in the art, variations and modifications can be made to the disclosed examples of the passive restraint stroller configurations. Further, each example of a particular obstruction disclosed herein can be varied and modified in size, shape, and contour without departing from the spirit and scope of the present invention. In each example, the obstruction can be integrally molded or otherwise formed as a part of the component which carries the obstruction. For example, the obstruction shown in FIG. **3** on the underside of the tray can be integrally molded as a plastic part depending from the plastic tray. Similarly, the obstruction shown in FIG. **4** can be integrally molded as a part of the plastic seat support surface.

[**0026**] The current ASTM standard for stroller foot openings specifies a test to be performed on all strollers that have a tray or grab bar that traverses the stroller above the seat. The current test standard specifies using a torso probe **70**, as shown in FIGS. **6**A-**6**C, and a head probe **80**, as shown in FIG. **7**. Each probe is to be representative of a specified percentile size child within the percentile range of a given age, such as for example a 13 month old child. The current standard requires that if the torso probe **70** can not pass through the foot opening, then the head probe **80** must not be able to pass through the opening. The intent of the standard is to prevent a child from being injured when their body slips between the tray or bar and the seat, while their head and neck gets trapped between the tray and seat bottom.

[**0027**] The passive restraint intent of the present invention, in one example, is to inhibit passage of both the torso

probe **70** and the head probe **80** through the foot opening **31**. The foot opening must still be able to function as intended by allowing an occupant's feet and legs to fit freely through the opening. Thus, the obstructions disclosed herein act as a full passive restraint prohibiting a child's torso from sliding between the tray and seat bottom of a stroller.

[**0028**] By way of example and turning again to FIGS. **6**A-**7**, the ASTM standard calls out a torso probe **70** having a rectangular configuration in plan view, but having rounded comers **72**. The probe **70** also has a depth, a leading edge portion **74** of which tapers at 45° from a smaller leading end **76** of the probe to a larger size trailing end **78**. The ASTM standard specifies that the probe has a 3 inch height, a 5.5 inch width, and an overall 4.25 inch length. The standard also specifies that the trailing end **78** beyond the leading edge portion **74** taper have a 3 inch depth or length with a generally rectangular cylindrical shape, but with the rounded corners **72**. The specified head probe **80** is a simple spherical shape with an 8 inch diameter. The head probe **80** is said to be representative of a 95 percentile tip-of-chin to back-of-head dimension for a 13 month old child.

[**0029**] Using these same probe dimensions for the examples described herein, neither the 8 inch head probe **80** nor the rectangular torso probe **70** should be able to fit completely through either one of the foot opening regions **31**A or **31**B, or any portion of the foot opening **31** in order to perform the passive restraint function. As a result, if a child were to place both of their feet on one side of any of the disclosed obstructions, i.e., into either of the regions **31**A or **31**B of the foot opening **31**, neither their torso nor their head would fit within that region between the tray and seat bottom. It is also certainly possible that a passive restraint could be constructed according to the teachings of the present that meets only the current standard. In other words, if the child's torso can fit through any part of the foot opening, then the head must also fit through the opening.

[**0030**] The disclosed obstructions creating the passive restraint examples described herein project into the foot opening between the tray and the seat bottom of a stroller. In these examples, the obstruction, whether on the tray, on the seat bottom, or both, is positioned generally relative to a side to side or lateral position, at the center of the foot opening **31**. It is conceivable that one or more obstructions could be utilized that are not positioned on the lateral center and yet function as intended as a passive restraint in a stroller. Further, the orientation of the foot opening created between the traversing structure and the seat bottom is at least in a somewhat or generally vertical plane. The projections extend or project into the foot opening generally within the foot opening plane in the disclosed examples.

[**0031**] Although certain stroller and passive restraint examples have been described herein in accordance with the teachings of the present disclosure, the scope of coverage of this patent is not limited thereto. On the contrary, this patent covers all embodiments of the teachings of the disclosure that fairly fall within the scope of permissible equivalents.

1. A stroller comprising:

at least one seat supported by a frame assembly, the seat having a seat back and a seat bottom;

a traversing structure extending laterally across the seat, spaced forward of a surface of the seat back, and spaced upward of a surface of the seat bottom;

a foot opening beneath the traversing structure, above the seat bottom, and between opposed, spaced apart side frame sections of the frame assembly; and

a passive restraint obstruction including 1) a structure extending downward from a portion of the traversing structure into and reducing a size of the foot opening, and 2) a structure extending upward from the seat bottom, wherein the downward extending structure does not contact the upward extending structures,

wherein the downwardly extending structure extends downwardly a first distance, and wherein the upwardly extending structure extends upwardly a second distance such that the first distance is not equal to the second distance.

2. (canceled)

3. (canceled)

4. (canceled)

5. The stroller according to claim 1, wherein the traversing structure is a tray.

6. The stroller according to claim 5, wherein the downward extending structure is a plastic component, integrally molded as a part of the traversing structure.

7. (canceled)

8. The stroller according to claim 1, wherein the downward extending structure is permanently connected to the traversing structure.

9. The stroller according to claim 4, wherein the upward extending structure is permanently connected to the seat bottom.

10. (canceled)

11. The stroller according to claim 1, wherein the second distance is greater than the first distance.

* * * * *