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(54) **STROLLER**

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(58) **Field of Search** 280/650, 647,
280/642, 643, 644, 655.1, 47.38, 47.41,
47.371

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,191,397 A * 3/1980 Kassai 280/647
4,317,581 A * 3/1982 Kassai 280/644

4,697,823 A * 10/1987 Kassai 280/644
D293,776 S 1/1988 Maard
5,622,376 A * 4/1997 Shamie 280/642
5,622,377 A * 4/1997 Shamie 280/642
5,660,435 A 8/1997 Eichhorn
5,695,212 A 12/1997 Hinkston
5,775,718 A * 7/1998 Huang 280/642
5,887,889 A 3/1999 Andrus
5,988,670 A * 11/1999 Song et al. 280/648
6,056,306 A 5/2000 Rust et al.
6,086,086 A * 7/2000 Hanson et al. 280/650
6,155,628 A 12/2000 Williams
6,270,111 B1 * 8/2001 Hanson et al. 280/650
6,357,784 B1 * 3/2002 Mitzman 280/642
2002/0113414 A1 * 8/2002 Tomasi et al. 280/650

* cited by examiner

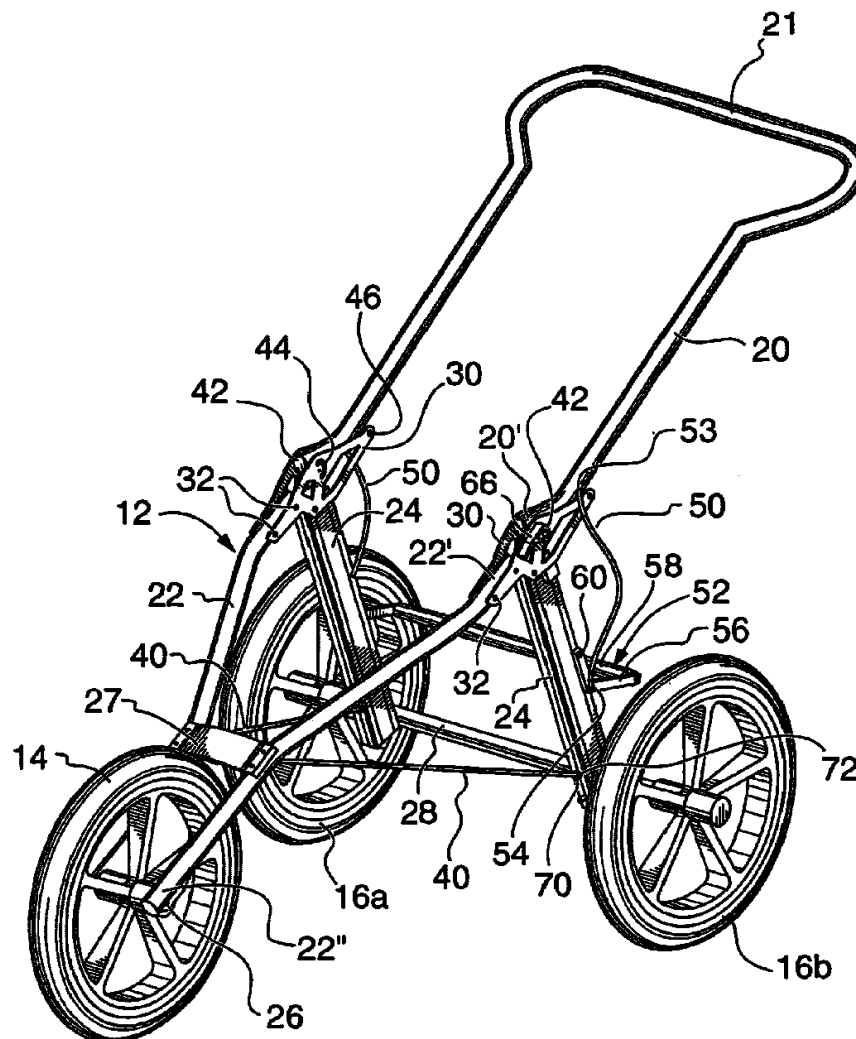
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(57) **ABSTRACT**

A stroller is described that is foldable and includes a tracking adjustment mechanism. The stroller is folded by pivoting the main frame members about one pair of main connecting brackets. Handle height adjustment can be made at the bracket. Some foldable frame cross members are formed of cable, rather than tubing to reduce the weight and folded size of the stroller over stroller having foldable cross members formed of tubing. A stroller having adjustable wheel spacing for tracking and stroller center of gravity adjustment is also described.

40 Claims, 9 Drawing Sheets



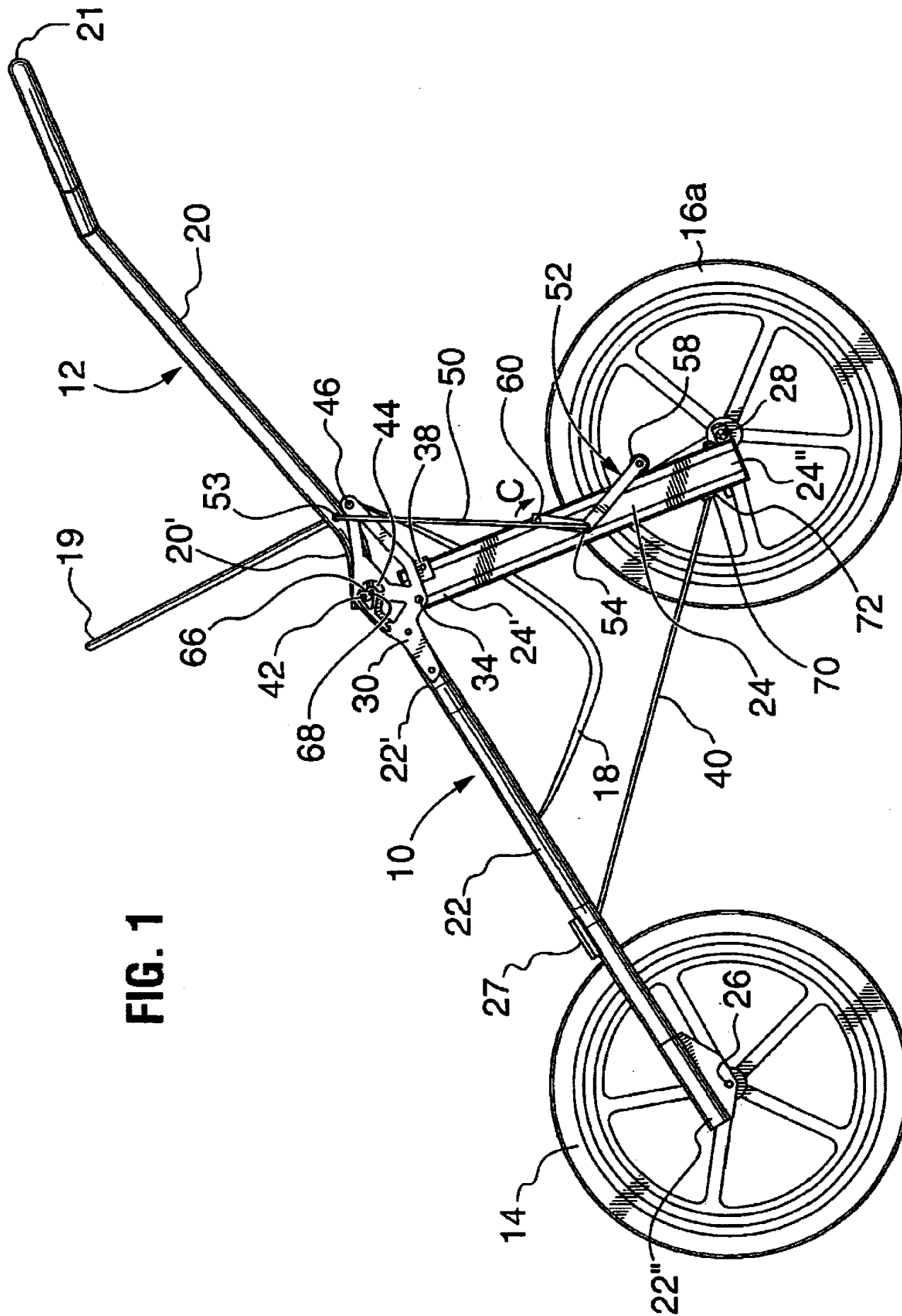


FIG. 1

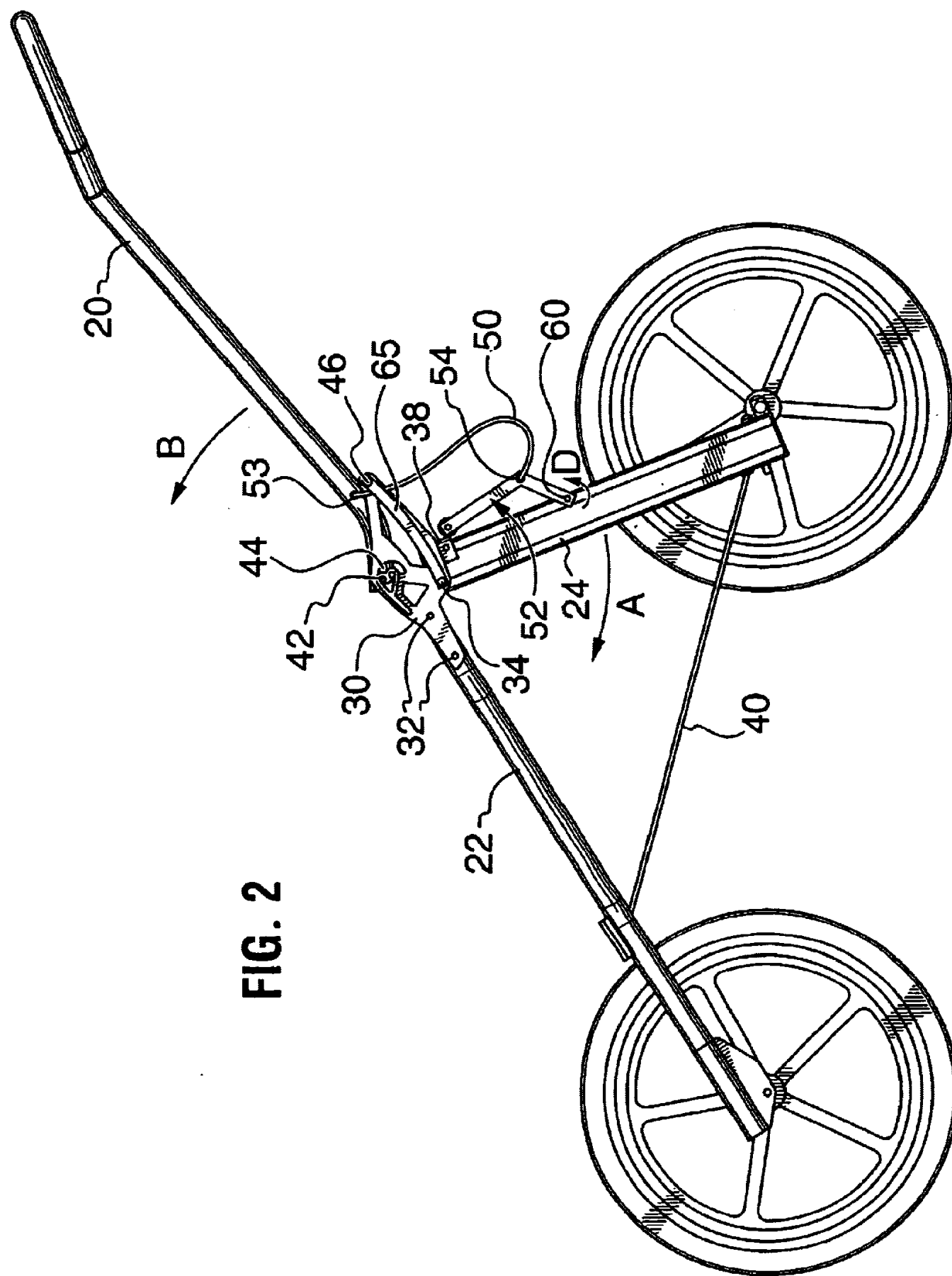


FIG. 2

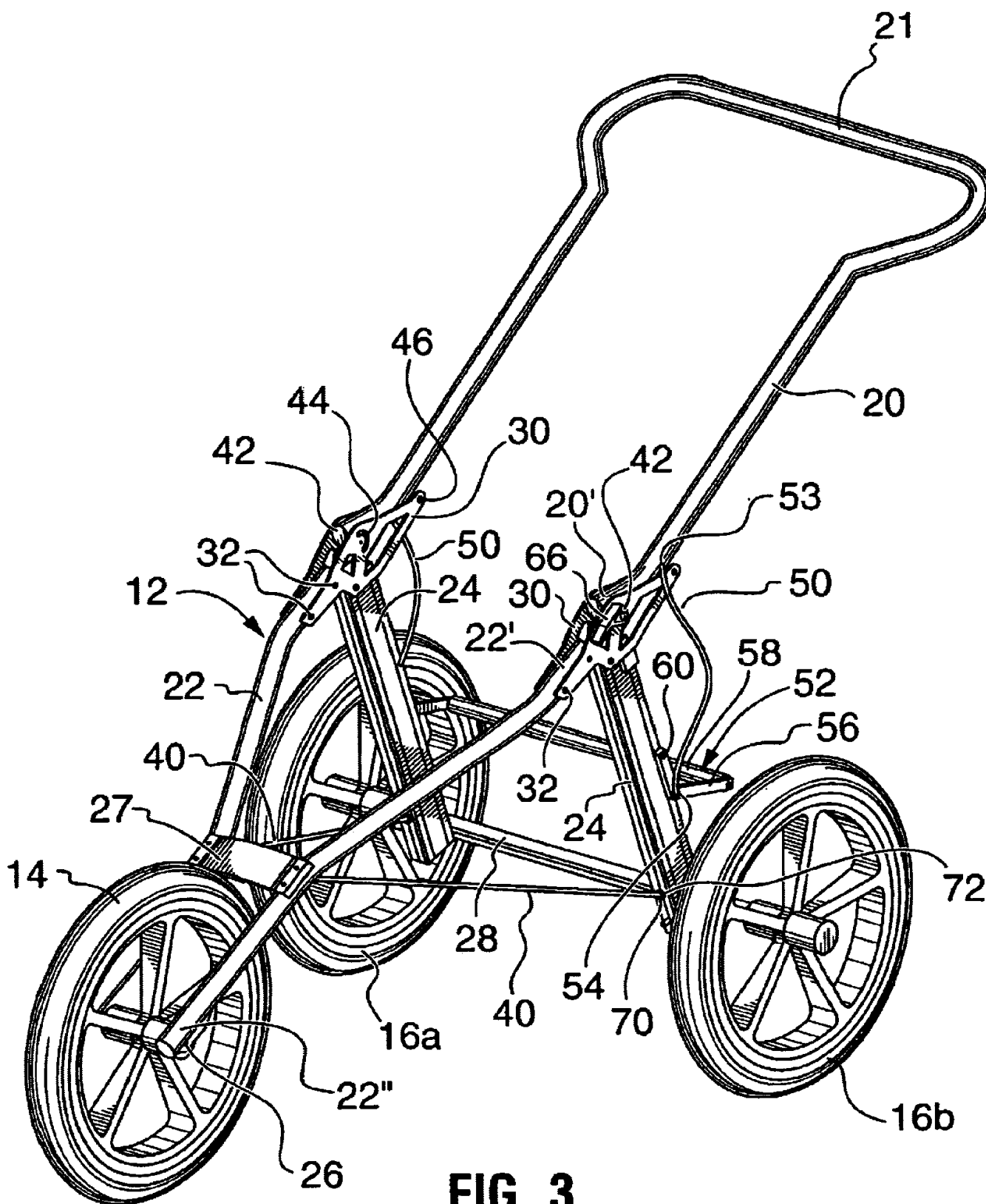


FIG. 3

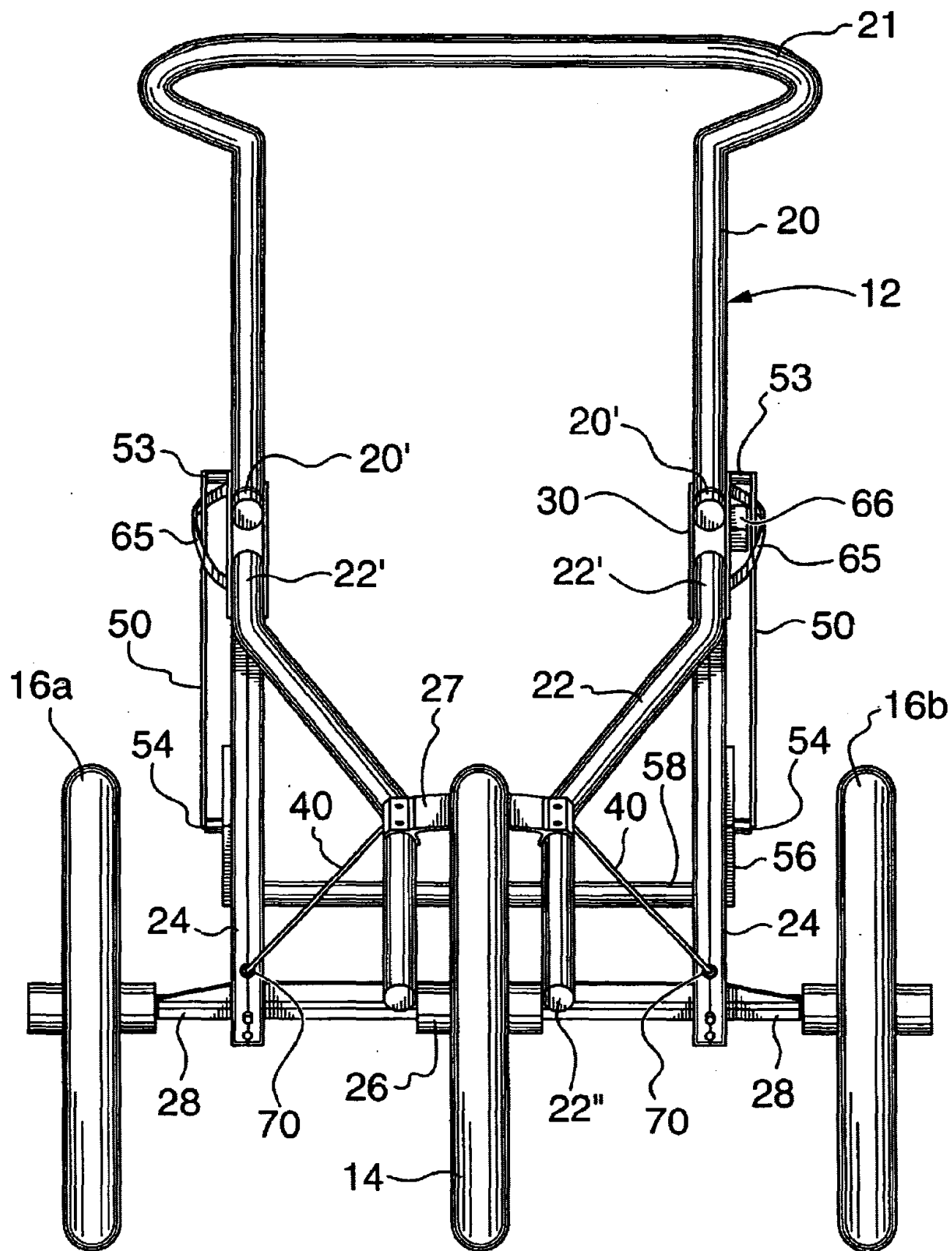


FIG. 4

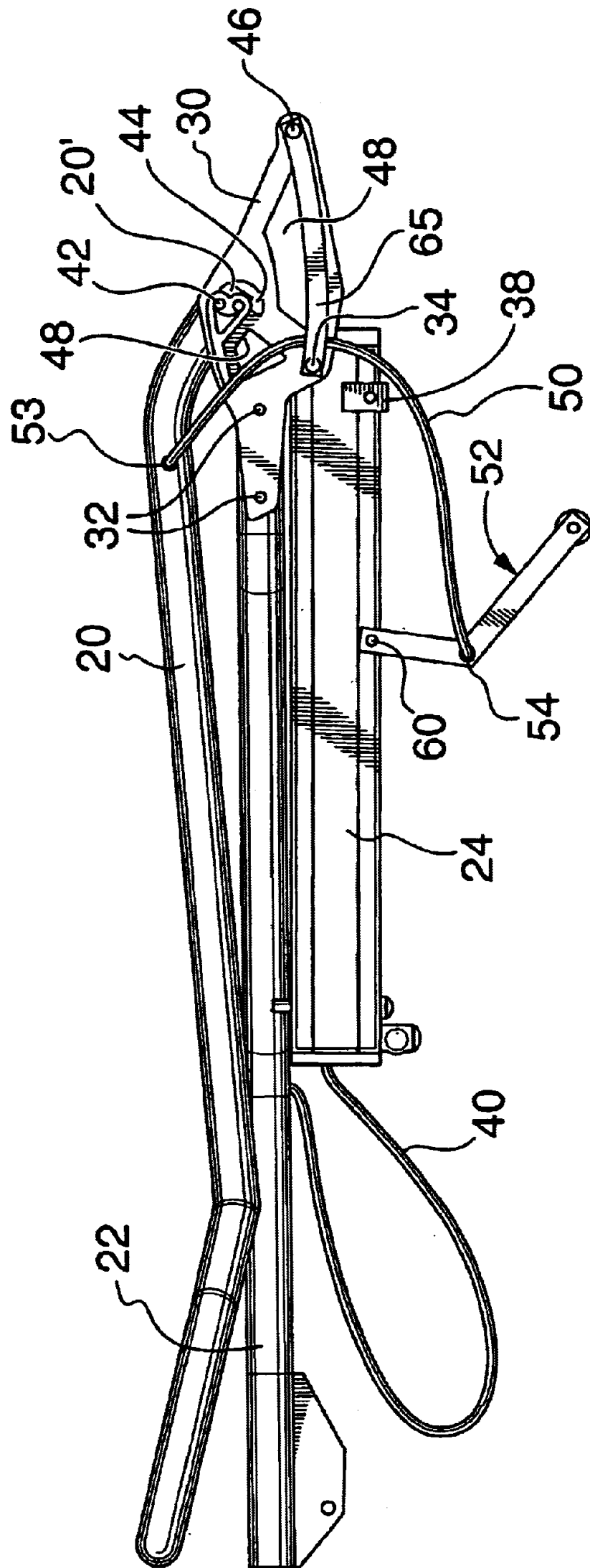


FIG. 5

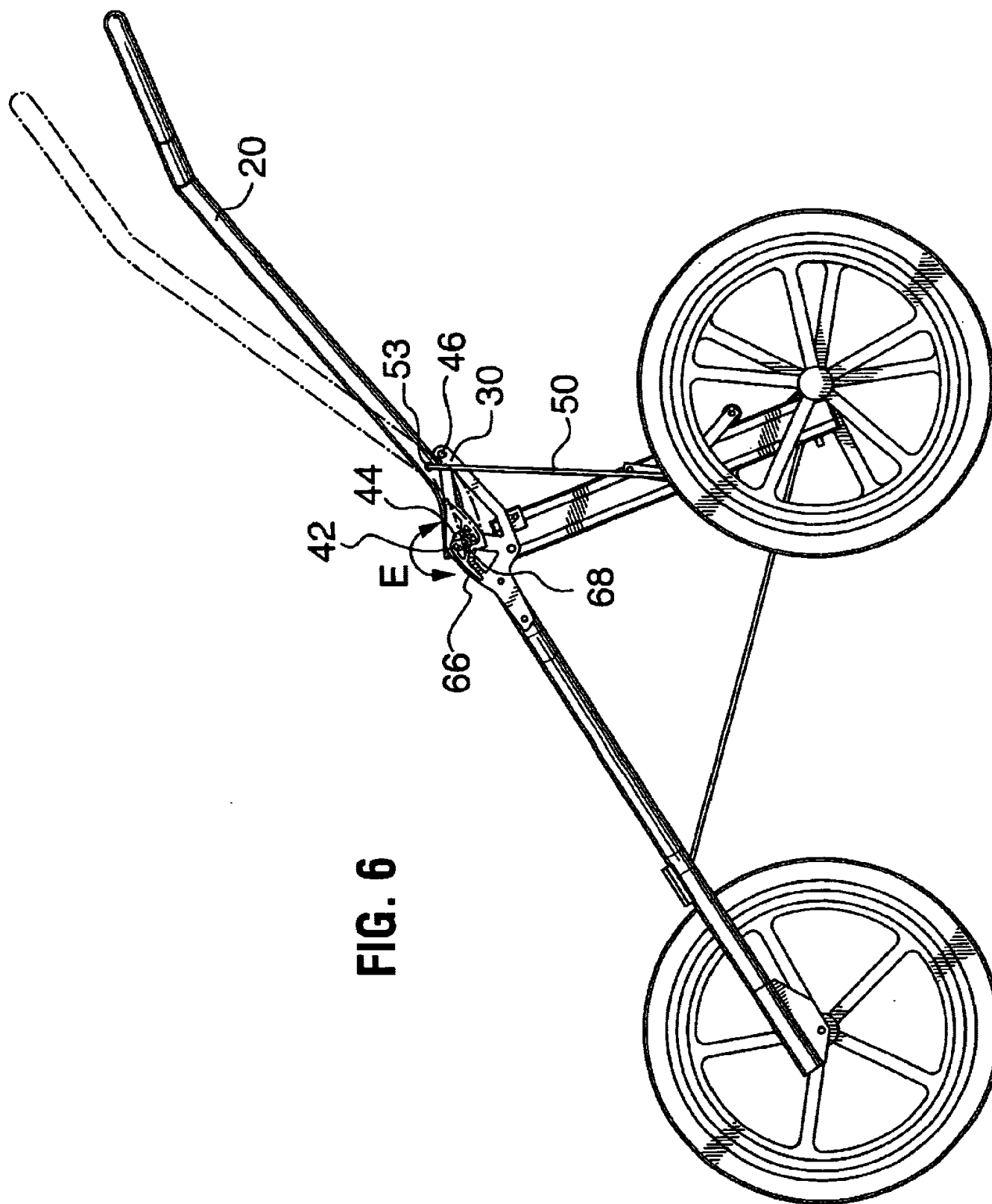
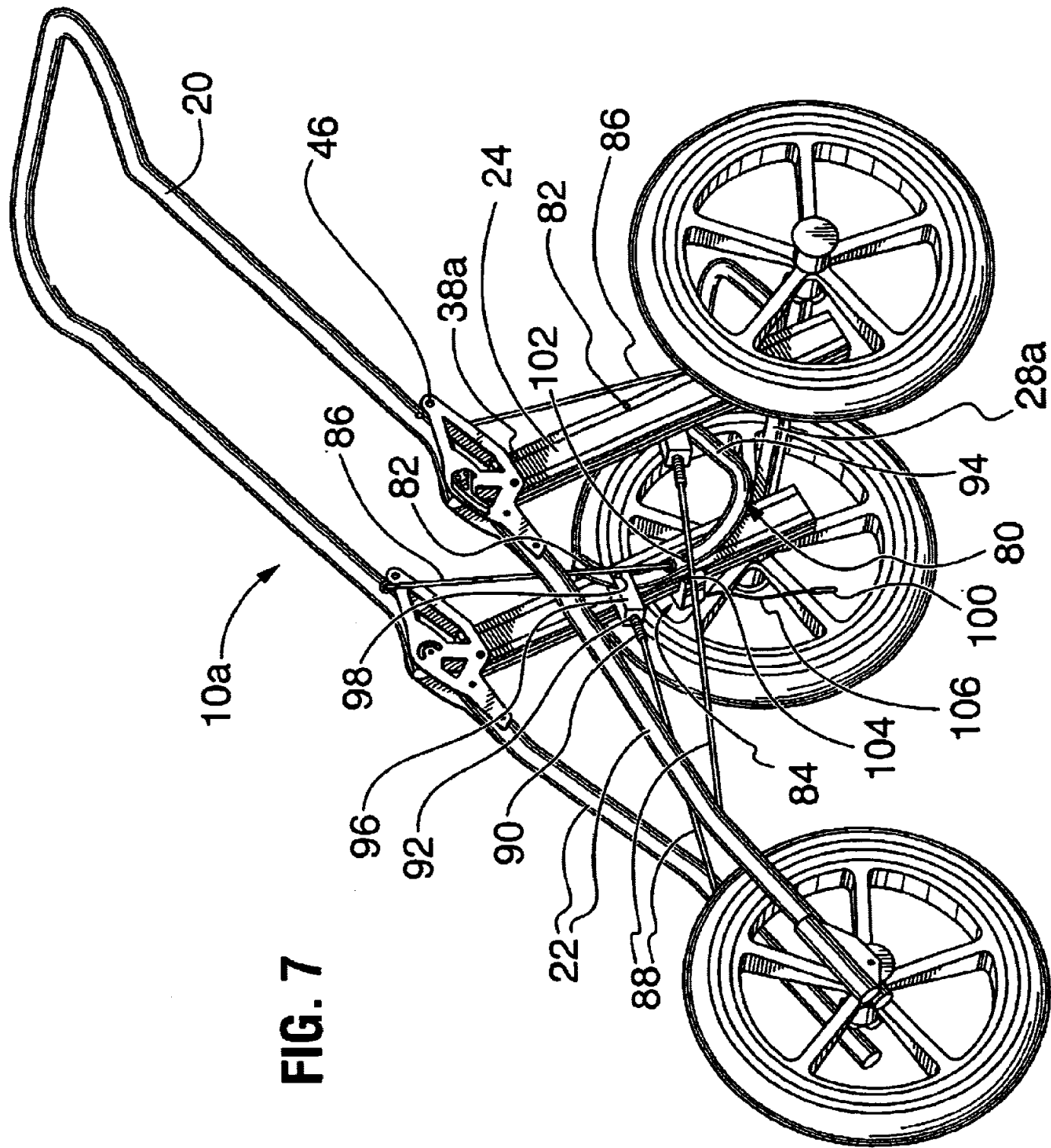


FIG. 6



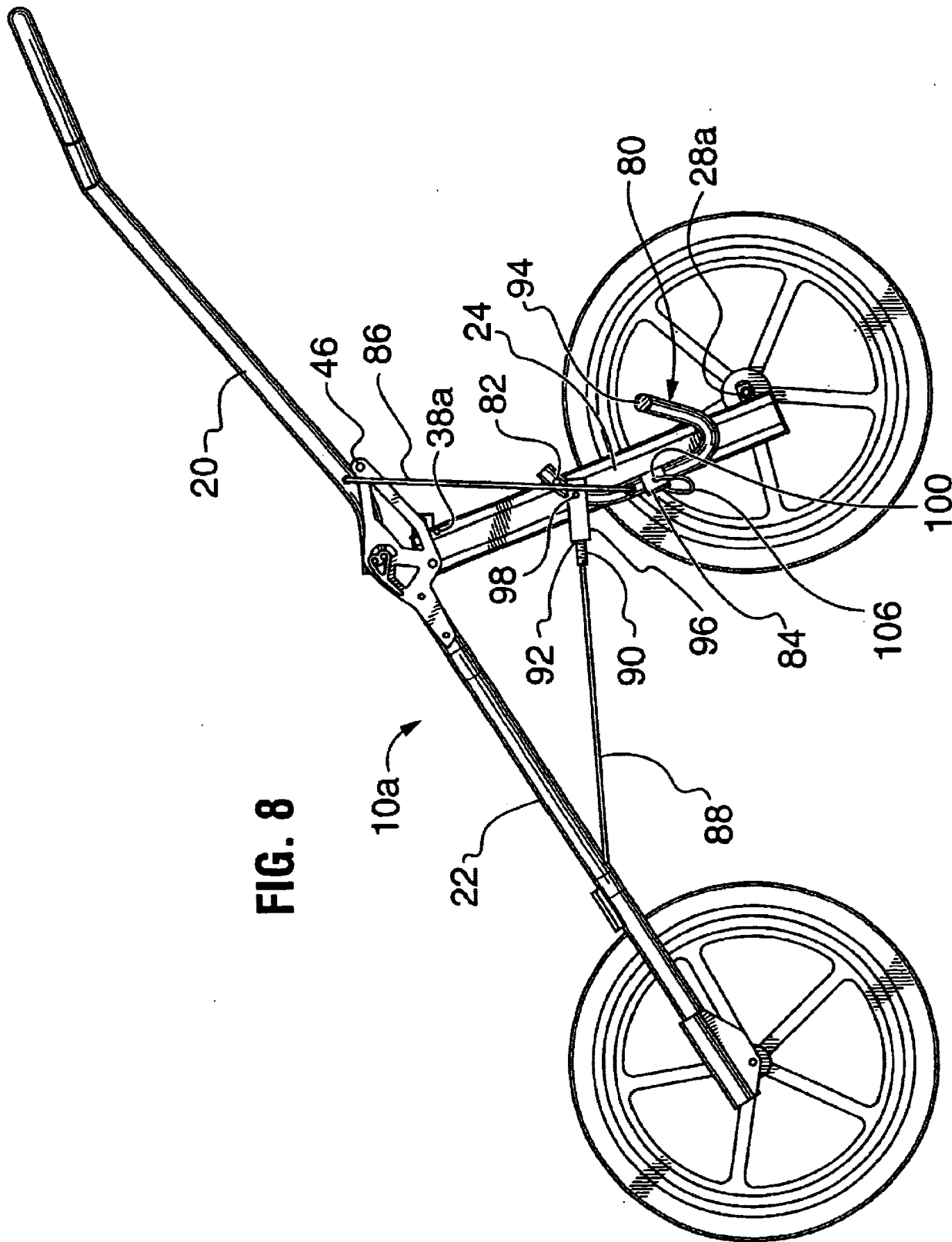


FIG. 8

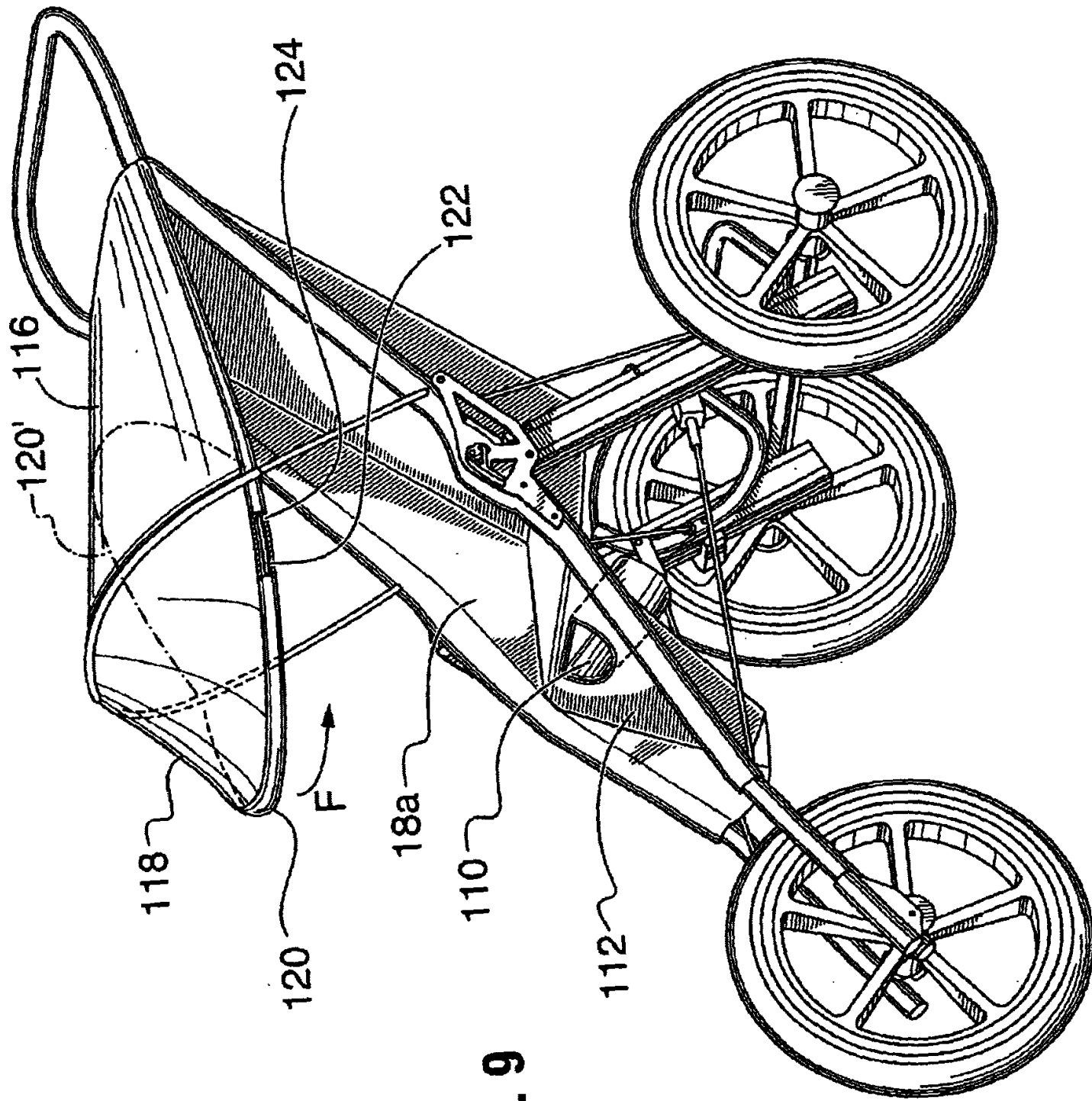


FIG. 9

STROLLER**FIELD OF THE INVENTION**

This invention is directed to a stroller and, in particular, to a stroller that can be folded for storage.

BACKGROUND OF THE INVENTION

In recent years, many developments have been made with respect to strollers. In particular, the folding features and handleability of strollers have been improved and strollers have been developed for use while jogging or in-line skating, over rugged terrain and through snow and sand.

While some previously available strollers are foldable, many folding systems are complex both in terms of use and in terms of manufacture. The various cross members required to permit folding while maintaining stroller frame rigidity can increase the weight of the stroller to undesirable levels and add to the bulk of the folded trailer.

The use of strollers is often uncomfortable because the gripping portion of the stroller handle is at an incorrect height for the user. While some strollers include mechanisms for handle height adjustment, these mechanisms are often not user friendly. The mechanisms generally require the installation of an adjustment connection near the gripping portion which can weaken the handle and which complicates stroller construction, thereby increasing stroller cost.

A common problem with previous strollers is the tendency for their wheels to move out of alignment, thereby adversely affecting stroller tracking. In particular, the front wheel or wheels can become off-centre or out of parallel position relative to the rear wheels.

Many strollers do not provide a mechanism for adjusting the stroller's center of gravity, except by adjusting the position of the child or bags etc. loaded into the stroller. Therefore, the weight on the front forks can't be reliably adjusted and the performance of the stroller cannot be controlled in this respect.

A stroller is needed that overcomes at least some of these problems of previous strollers.

SUMMARY OF THE INVENTION

The stroller of the present invention overcomes some of the problems set out above with respect to previous strollers. A stroller folding system is disclosed which is simple with respect to both use and manufacture and includes foldable cross members that are light-weight and durable. Stroller mechanisms are also disclosed for correcting tracking problems and to select handle height.

One stroller according to the present invention can be folded for storage and transport. The stroller includes three main structural units that pivot relative to each other at closely positioned pivotal axes. The pivotal axes are defined by a pair of brackets aligned one on each side of the stroller and into which each of the three main structural units are connected. This permits stroller construction to be simplified since only one pair of brackets is needed to be formed and mounted into the frame and many mechanical connections on the stroller are made through that pair of brackets. The procedure by which the stroller is folded is also simplified by use of the pair of aligned brackets in the present stroller.

In accordance with a broad aspect of the present invention, there is provided a stroller having a forward end and a rear end and a long axis extending through the forward

end and the rear end, the stroller comprising: a plurality of wheels for supporting the stroller including at least one forward wheel positioned forward of the stroller's centre of gravity and rear wheels; a frame supported by the wheels having main frame members including front wheel supports for engaging the at least one front wheel, a handle bar for grasping and moving the stroller and rear wheel supports for engaging the rear wheels; a connecting bracket on each side of the frame having connected thereto the main frame members and at least two of the main frame members being pivotally moveable at their connection to the connecting brackets and the connecting bracket positioned to permit the at least two main frame members to pivot about the bracket such that the stroller can be manipulated between an upright position and a folded position; and a locking means for releasably locking the stroller in the upright position.

As will be appreciated, in a three-wheeled stroller there will generally be a single front wheel supported on front forks and a pair of rear wheels. In a four-wheeled stroller the frame will generally be supported on four wheels, with two forward and two at the rear. Generally, the rear wheel supports will be connected such that they pivot together during manipulation of the frame, as will the front wheel supports in a four-wheeled stroller.

In one embodiment, the front wheel supports are rigidly connected to the connecting brackets, while the handle and rear wheel supports are pivotally connected to the connecting brackets. This arrangement provides a compact configuration when the stroller is in the folded position. In addition, this has been found to particularly facilitate the unfolding operation of the stroller since by simply lifting the folded stroller by the front wheel supports, the rear wheel supports will rotate down and away and the stroller will automatically be in a configuration in which it can be supported on its wheels.

The frame of the stroller can be formed of various rigid materials including, but not limited to, aluminum or polymeric tubing, rods or bars. The frame can include frame cross members for providing locking the stroller into a rigid position or maintaining positioning of stroller components. These frame cross members can also be formed of aluminum or polymeric tubing, rods or bars or can alternately be formed of flexible cables, as will be discussed in more detail. The frame supports a seat for accepting one or more children and, if desired, a covering or sunshade to shelter the seat. In one embodiment, the seat includes a drink bottle pocket formed in the forward part of the seat, which is accessible by a child positioned in the seat. Preferably the pocket is positioned in the seat in the area between a child passenger's legs. In another embodiment, the sunshade includes a visor including a stiffening member permitting the visor to be set in a stationary in-use position. Preferably, the stiffening member is adjustable such that it can be moved between the stationary in-use position and a stored position.

The handle can be formed in any way to facilitate grasping and control of the stroller. Preferably, the handle is height adjustable to be comfortable for users of various height. In one embodiment, the connecting bracket includes a mechanism for handle height adjustment. Preferably, the mechanism is incorporated into the handle's pivotal connection to the connecting bracket.

To provide frame rigidity the rear supports can have extending therebetween a cross bar or an axle. The frame can also include other cross members such as one extending between the front wheel supports and the rear supports.

The wheels are selected to support the frame and permit it to be rolled as by pushing. The wheels can be of any

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desired size. Preferably, the wheels are mounted to rotate in planes parallel with the long axis of the stroller and are restricted from pivoting out of these planes. A relative wheel positioning mechanism can be mounted on the stroller to permit adjustment of relative wheel alignment and/or spacing for tracking or center of gravity adjustment.

The locking means can be any mechanism or part for locking frame members in an upright position. As an example, the locking means can be pins, fasteners, over-center mechanisms, etc.

Another stroller according to the present invention includes at least one flexible elongate cross member extending to act between main frame members. The cross member is connected to act between main frame members to maintain or limit their spacing and is particularly useful for extending between main frame members that are pivotable relative to each other and for being placed in tension between main frame members. The flexible elongate cross member can in some applications replace a stiff cross member, thereby reducing stroller complexity, folded size and weight.

Thus, according to another broad aspect of the present invention, there is provided a stroller having a forward end and a rear end and a long axis extending through the forward end and the rear end, the stroller comprising: a plurality of wheels for supporting the stroller including at least one front wheel positioned forward of the stroller's centre of gravity and rear wheels; a frame supported by the wheels having main frame members including (a) front wheel supports for engaging the at least one front wheel, (b) a handle bar for grasping and moving the stroller and (c) rear supports securing and extending upwardly from the rear wheels; and a flexible, elongate cross member extending to act between at least two of the main frame members to control the spacing between the main frame members.

The flexible elongate cross member can be, for example, a strap, a cord, a chain or a cable. Preferably, the flexible elongate member is substantially inextensible so that the length of the cross member once in tension between two main frame members will limit the degree to which they can be separated. However, in one embodiment, the cross member has a capability of limited stretch under loads beyond a selected level so that it provides a suspension effect.

In one embodiment, the flexible elongate member is secured in fixed positions on the at least two main frame members between which it extends. In another embodiment, the flexible elongate member is secured to stroller components connected to main frame members, but through which the flexible elongate member can act to adjust the spacing between the main frame members. In another embodiment, the stroller includes a tension adjustment means for selecting the tension in the flexible elongate member as it extends between the main frame members. Various tension adjustment means such as, for example, threaded connections, turn buckles, clamps and levers are useful with the stroller.

In one stroller according to the present invention, the flexible elongate member is included in an over-center mechanism for providing frame rigidity between two main frame members. In another stroller according to the present invention, the flexible elongate member acts between the front wheel supports and the rear supports to limit the spacing therebetween.

There are various situations wherein it is desirable to adjust the spacing between the front and rear wheels. For example, the stroller center of gravity, and thereby the weight placed on the front wheel or wheels, can be con-

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trolled in part by adjusting the space between the front and rear wheels. In addition, due to manufacturing or wear and tear, the spacing and alignment between the wheels can tend to cause a stroller to lose its ability to track straight. Thus, another stroller according to the present invention includes a means for relative wheel positioning, for example, to adjust stroller center of gravity and/or tracking.

Thus, according to yet another broad aspect of the present invention, there is provided a stroller having a forward end and a rear end and a long axis extending through the forward end and the rear end, the stroller comprising: a plurality of wheels for supporting the stroller including at least one front wheel positioned forward of the stroller's centre of gravity, a left rear wheel and a right rear wheel; a frame supported by the wheels including front wheel supports securing and extending rearwardly from the at least one front wheel, a handle bar for grasping and moving the stroller, a left rear support securing and extending upwardly from the left rear wheel and a right rear support securing and extending upwardly from the right rear wheel; and a relative wheel positioning means for selecting and maintaining the spacing of the at least one front wheel relative to at least one of the left rear wheel and the right rear wheel.

The relative wheel positioning means is useful for strollers supported on both three and four wheels. In a three-wheeled stroller, the relative wheel positioning means includes a mechanism for adjusting the spacing between the front wheel and each of the left and right rear wheels. In a four-wheeled stroller, the relative wheel positioning means includes a mechanism for adjusting the spacing between the right-side front and rear wheels and the left-side front and rear wheels.

In one embodiment, the relative wheel positioning means is two elongate members each one extending to act between the front wheel supports and one of the rear supports to control the spacing therebetween. In a three-wheeled stroller each elongate member extends between the front forks and one of the rear supports. In a four wheeled stroller, the elongate members can extend between the front and rear wheels in a parallel or a cross pattern. Each of the elongate members is substantially inextensible. The elongate members can each include a mechanism for selecting its extended length. Preferably, the mechanism for adjusting the length of the elongate member can be actuated to adjust the length while the elongate member remains connected between the front wheel support and its rear support. The mechanism for adjusting the length can be a threaded connection in the elongate member or between the elongate member and one of the supports, a telescoping member, a turn buckle, etc. In one embodiment, while the elongate members are substantially inextensible, they have limited elasticity such that loads over a selected level will cause the elongate members to stretch slightly to provide for suspension effect. In one embodiment, the elongate members each include a flexible elongate portion. The flexible elongate portion can be for example, formed of cable, chain, strap, etc. The use of a flexible portion facilitates folding of the stroller.

According to another broad aspect of the present invention, there is provided a stroller having a forward end and a rear end and a long axis extending through the forward end and the rear end, the stroller comprising: a plurality of wheels for supporting the stroller including at least one front wheel positioned forward of the stroller's centre of gravity, a left rear wheel and a right rear wheel; a frame supported by the wheels including front wheel supports securing and extending rearwardly from the at least one front wheel, a left rear support securing and extending upwardly from the left

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rear wheel, a right rear support securing and extending upwardly from the right rear wheel; and a handle bar for grasping and moving the stroller, the handle bar being connected into the frame by a pivotal connection and the pivotal connection being incorporated into a mechanism for handle height adjustment with respect to the stroller.

In one embodiment, the pivotal connection includes a pin secured to the handle and slidably engaged in a slot on the frame. The pin is slideably moveable in the slot between a first position and a second position, to drive the handle against a fixed fulcrum such that the gripping portion of the handle is moved into a higher position when the pin is in the first position and the gripping portion of the handle is in a lower position when the pin is in the second position. A releasable lock is provided to maintain the pin in the first position or the second position during use.

The features of (i) a pair of brackets onto which all main frame members are secured and about which selected main frame members pivot for folding; (ii) flexible cross members, (iii) relative wheel positioning means and (iv) handle height adjustment can all be used on the same stroller or individually or in combination on any particular stroller, as desired.

BRIEF DESCRIPTION OF THE DRAWINGS

A further, detailed, description of the invention, briefly described above, will follow by reference to the following drawings of specific embodiments of the invention. These drawings depict only typical embodiments of the invention and are therefore not to be considered limiting of its scope. In the drawings:

FIG. 1 is a side elevation view of a stroller according to the present invention in an upright, locked position ready for use. The left rear wheel has been removed to facilitate illustration;

FIG. 2 is a side elevation view of the stroller of FIG. 1 with the seat removed and in upright, unlocked position ready for folding. The left rear wheel has been removed to facilitate illustration;

FIG. 3 is a perspective view of the stroller of FIG. 2;

FIG. 4 is a front elevation view of the stroller of FIG. 1 with the seat removed;

FIG. 5 is a side elevation view of the stroller of FIG. 1 in folded configuration with the wheels removed;

FIG. 6 is a side elevation view of a stroller according to the present invention showing handle height adjustment;

FIG. 7 is a perspective view of another stroller according to the present invention in a position approaching the locked position;

FIG. 8 is sectional view along the long axis of the stroller of FIG. 7 in an upright, locked position ready for use; and

FIG. 9 is view of the stroller of FIG. 7 with a seat and sun shade fitted thereon. A portion of the sun shade visor is cut away to expose the inner components thereof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. 1 to 6, a stroller 10 according to the present invention is shown. The stroller can be used to transport a child. The stroller shown is a three-wheeled model but it will be apparent that the inventive features can be applied to a four wheel stroller directly or with only slight modification.

Stroller 10 includes a frame 12 supported on a front wheel 14 and two rear wheels 16a, 16b. Large diameter wheels, as

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shown, are preferred as they provide a smoother ride and greater stability over rough terrain and at jogging speeds. Frame 12 supports a seat 18 and a support 19 for a sun shade. The seat and sun shade or enclosures, if any, can be any desired configuration on the frame. However, a preferred embodiment of a seat and sun shade is illustrated in FIG. 9. The seat has been removed from the stroller in FIGS. 2 to 6 to facilitate illustration of the embodiments of the invention.

The frame includes a handle 20 for pushing the stroller, front forks 22 and rear supports 24. Handle 20 is generally a U-shaped member having forward ends 20' and a gripping portion 21.

Front forks 22 taper from upper ends 22' to front end 22" where the axle 26 of the front wheel is mounted. A quick release mechanism, as is known, is preferably provided at this connection to facilitate removal of the front wheel for storage. Front forks 22 include a strengthening cross bar 27.

Rear supports 24, including left and right rigid elongate members, engage at their lower ends 24" a common rear axle 28 for rear wheels 16a, 16b. The common axle serves to provide rigidity to the rear supports one relative to the other. Quick release mechanisms can also be used between the axle and the rear wheels.

The handle, front forks and rear supports are connected together at a bracket 30 on each side of the stroller. Preferably, the stroller is constructed to be folded about the connections between the frame components and the brackets. Thus, any pivotal connections between any one of the frame components and the brackets on either side of the stroller are aligned so that they work in unison.

In a preferred embodiment, as shown, front forks 22 are rigidly secured, as by use of fasteners 32, to brackets 30. Rear supports 24 are each pivotally connected to the bracket by pins 34 passing through holes in the brackets. Rear supports 24 together can pivot about pins 34 toward the underside of the front forks, as shown by arrow A in FIG. 2, until they are in a folded configuration under the front forks (FIG. 5). At least one, and preferably both, rear supports have mounted thereon a stop 38 that abuts against at least one bracket 30 to limit rotation of the rear supports about pins 34. As will be appreciated, generally at least some of the weight of the stroller load is accommodated through the stops. Thus, the stops are formed to withstand and effectively transfer that load. Pivotal movement about pins 34 away from the front forks is also limited by cables 40 which are flexible but substantially inextensible. A cable 40 is connected between front forks 22 and each rear support 24. It is useful to use the cables 40 together with stops 38 to enhance the absorption of forces during application of extreme loads, preventing, for example, bending of the front forks.

Being flexible, for example, made of steel braided cable or a polymeric cord, cables 40 can fold when rear supports 24 are folded toward forks 22. Thus, cables 40 strengthen the frame, maintain the spacing between the front and rear wheels and permit folding while being light-weight and simple and economical to use in stroller construction. The cables are useful in tracking and center of gravity adjustment, as will be described hereinafter. While the cables are substantially inextensible, they preferably have limited stretch when placed under extreme tensile loads and as such provide a degree of shock absorption. However, any degree of stretch should not interfere with the primary purpose of the cables which is to maintain or limit the spacing between the wheels. Alternatively, to provide for suspension, a shock absorbing means such as an elastomeric

plug (not shown) can be positioned to act at the attachment of the cables to the front forks and/or rear wheel supports.

Handle **20** is pivotally connected at ends **20'** through pins **42** to brackets **30**. Pins **42** ride in slots **44** and permit the handle to pivot relative to the brackets. The handle can be pivoted at pins **42** toward the top side of the front forks, as shown by arrow B in FIG. 2, until they are in a folded configuration on the front forks (FIG. 5). Brackets **30** includes stops **46** for limiting rotation of the handle away from the front forks. Stops **46** can be structures mounted into or formed integral with the brackets.

Brackets **30**, as will be appreciated, must be formed of durable yet easily formed materials such as, for example, polymeric materials or aluminum. To reduce the weight and amounts of materials required to form a bracket, openings **48** can be formed in non-functioning areas, provided the strength of the bracket is not compromised.

It will be appreciated that the stroller can be set up into an unfolded configuration by simply pivoting the handle and the rear supports away from the front forks and placing the stroller on its wheels. However for proper use of the stroller, handle **20** and rear supports **24** must be locked into their fully unfolded configurations, as shown in FIG. 1. While a plurality of locks could be used, preferably a lock is used that when actuated releases both the handle and the rear supports for pivotal movement such that separate actuation of a lock for each frame member is avoided. In a preferred embodiment, the lock when actuated releases or locks the handle and the rear supports substantially simultaneously. In the illustrated embodiment, lock cables **50** and over centre clamp **52** lock both (i) rear supports **24** against stops **38** and/or the tension in cables **40** and (ii) handle **20** against stops **46**. Cables **50** are substantially inextensible and formed, for example, of braided steel cable. The cables are positioned one on each side of the stroller and are fixedly secured to handle **20** at connections **53** and to overcentre clamp **52** at connections **54**. Overcentre clamp **52** includes side members **56** and a handle **58** extending therebetween. The side members of the clamp are pivotally connected by pins **60** to rear supports **24**. Other clamp configurations can be used, such as a clamp handle centrally positioned between the rear supports or a molded one piece clamp.

Cables **50** are selected to be of a length just slightly less than the maximum distance between connections **53** and connections **54**. Once the stroller is set up on its wheels with handle **20** resting against stops **46**, the lock can be actuated. To actuate the lock, over centre clamp **52** is pivoted about its connection to the rear members. In particular, to lock the handle and rear supports into their fully extended positions, the overcentre clamp is rotated down away from handle **20**, as indicated by arrow C. This draws the cables down and puts them under tension. Because cables **50** are not as long as the maximum distance between connections **53** and **54** the cables will tend to resist rotation of clamp **52** away from handle **20** beyond a distance, as determined by their length and their point of connection to the clamp. However by application of sufficient pressure to stretch the cables slightly, continued rotation of the clamp down away from handle **20** is possible and will tighten the cables down and cause them to overcentre past fasteners **60** (FIG. 1). Once overcentred, cables **50** will drive clamp **52** against rear supports **24** and handle **20** and the rear supports will be locked into their fully extended positions. To unlock the frame in order to permit folding thereof, force will have to be applied to clamp handle **58** in the direction indicated by arrow D to move the cables past fasteners **60** (FIG. 2). As will be appreciated, force applied to clamp handle **58** will

move side members **56** to substantially simultaneously lock or unlock both handle **20** and rear supports **24**.

As will be appreciated, if cables **50**, during an unfolding operation, move forwardly of pins **34**, handle **20** and rear supports **24** will be locked from fully unfolding. Therefore, in a preferred embodiment, a cable restraint **65** is mounted on bracket **30** to restrict cable movement behind pins **34**. Cable restraint **65** can be, for example, a slot or a rigid rod or a flexible strap connected at each end to bracket **30**.

In the preferred embodiment, as best illustrated in FIG. 6, the height of handle **20** is adjustable. Advantageously, such adjustment is made at bracket **30** which is at the front end **20'** of handle. This reduces complexity in stroller construction and increases handle rigidity over previous strollers wherein height adjustment occurs at the gripping end or away from the connection of the handle to the frame. Handle height adjustment is simple and user friendly.

In particular, preferably slot **44** is formed as an arc and pin **42** is connected to the handle and rides in the slot. Pin **42** also extends through a lever **66** having a fulcrum at pin **68**. Lever **66** can be rotated, as shown by arrows E, about fulcrum pin **68** to drive pin **42** along slot **44** between its ends. This drives end **20'** of the handle up and down relative to the bracket. Handle **20** then acts as a lever using stop **46** as a fulcrum which causes gripping portion **21** to be raised and lowered. When pin **42** is in the upper portion of slot **44**, the handle will be in a lower gripping position, shown in solid lines in FIG. 6. When pin **42** is rotated to the lower portion of slot **44**, the handle will be in an higher gripping position, as shown in phantom.

When cables **50** are locked overcentre, pin **42** is driven into its position at either end of slot **44** and remains firmly in place. Preferably, connection **53** of the cables to the handle is adjacent stop **46**. Handle **20** rests against stop **46** and remains positionally fixed adjacent the stop regardless of which height position the handle is in, so that the length and locking of cables **50** is not affected by adjustment of the handle height.

As noted previously, relative wheel positioning is an important consideration with strollers. In particular, relative wheel positioning affects stroller tracking and center of gravity. Off-straight tracking can be caused by manufacturing tolerances and/or by wear and tear. The stroller of the present invention includes a relative wheel positioning mechanism that can be used to adjust tracking and center of gravity. The relative wheel positioning mechanism includes cables **40** that are adjustable in their extended length, as by cable length adjustment screws **70**. In particular, cables **40** are secured to screws **70** that thread into threaded apertures **72** on the rear supports **24**. It may be desirable to limit the degree to which the cable length can be changed. Alternately it may be desirable to use a cable length modification means, such as a turn buckle, which permits more significant cable length changes.

Since off-straight tracking is caused by misalignment between the front and the rear tires and/or misalignment of the front tire with respect to the long axis of the stroller, adjustment of the lengths of cables **40** will adjust wheel spacing and, thereby, wheel alignment and tracking. If the stroller is tracking to the side, one or both screws **70** can be threaded into or out of the apertures to adjust the tension in the cable to which it is attached. As an example, if the stroller is tracking to the left, the right screw could be tightened to correct this problem.

Center of gravity can be adjusted in part by controlling the distance between the front wheel and the rear wheels. The

center of gravity will determine the weight that is placed on the front wheel, which will determine how easily the trailer will tip rearwardly about the rear wheels. The length of one or both cables **40** can be adjusted by screws **70** to adjust the spacing between the wheels and, thereby, the center of gravity.

It will be appreciated, that if considerable changes in the length of cables **40** is to be made, it will be necessary to have a length adjustment means on cables **50** to ensure that proper overcentering at the lock is still achieved.

Referring to FIGS. **7** and **8** another stroller **10a** according to the present invention is shown. In some jurisdictions, local regulations concerning stroller manufacture require that the stroller be locked into an upright position ready for use simultaneously when it is unfolded. This prevents the stroller from being used, by mistake, to transport a child when it is not yet locked into position for proper use.

Thus, in the stroller of FIG. **7** the frame members will be automatically locked into a fully extended position ready for proper use as soon as the stroller is fully unfolded, without a separate, manual lock actuation step. In particular, stroller **10a** includes a locking lever **80** pivotally connected to rear supports **24** by pins **82**.

A cross member **88**, formed of substantially inextensible cable, extends between front forks **22** and each side of the locking lever. By transferring tension from the cross members **88** through the locking lever to the rear supports, cross members **88** are useful for strengthening the frame and maintaining the spacing between the front and rear wheels. By use of thumbscrew **90** in threaded rivets **92**, the extended length of each cross member **88** can be adjusted to control the relative positioning of the wheels.

Stops **84** are also mounted to the rear supports and are positioned to limit the rotational movement of locking lever **80** toward front forks **22**. Lock cables **86** are secured on each side of the stroller between handle **20** and the locking lever. Lock cables **86** are similar in operation to the cables **50** of FIGS. **1** to **6** and are secured such that rotation of locking lever **80** towards stops **84** will cause the cables to over centre relative to pins **82**, thereby acting to lock lever **80** against stops **84**.

Overcentering of the cables relative to pins **82** causes the trailer to be locked in an upright position ready for use. In particular, handle **20** will be locked against stop **46** and rear supports **24** are locked against the tension in cross members **88** or against stops **38a**. To fold the trailer, sufficient pressure is applied to move cables **86** past pins **82** and to rotate locking lever **80** away from stops **84**. Locking lever **80** can include an upwardly curved portion **94** between the two side portions so that the force to collapse the trailer for folding can be applied by inserting the user's foot between the rear axle housing **28a** and the lever to provide adequate force to move the locking cables past pins **82**.

The locking arrangement as shown in FIGS. **7** and **8** is actuated automatically upon unfolding the stroller. In particular, the mounting of cross members **88** to locking lever **80** causes the locking lever to be drawn down toward stops **84** as soon as rear supports **24** are pivoted away from front forks **22**, placing the cross members under tension. When the stroller is placed on its wheels, locking lever **80** will be in a close to a locked position. Once the handle is moved back to rest against stops **46** and moderate downward pressure is applied to the stroller, cross members **88** will pull lever **80** into a locked, over centre position. To ease movement of the cross members relative to the locking lever, preferably cross members **88** are each pivotally connected to

the locking lever through a bracket **96**. Bracket **96** at one end is secured to its cross member **88** via threaded rivet **92** and at its opposite end is pivotally secured to lever **80** through pins **98**. Pin **82** can extend outwardly from lever **80** to act as a stop for bracket **96** so that lever **80** is prevented from rotating toward handle **20** so far that the cross members are over centred past pins **82**. This prevents the lever from locking up against the upper end of the rear wheel supports during the unfolding operation.

To prevent inadvertent release of locking lever **80** from its locked position, a safety lock such as a pin **100** can be inserted through alignable apertures **102**, **104** in lever **80** and at least one of stops **84**. Pin **100** can be attached to the trailer adjacent its stop via a cord **106**. It will be appreciated that pin **100** can also operate by passing through at least one of stops **84** or rear wheel supports **24** and simply trapping lever **80** against stops **84** rather than passing through the lever. It will also be appreciated that pin **100** could be replaced with a spring biased detent or other means.

Referring to FIG. **9**, a stroller is shown complete with seat and sun shade. The stroller has a covering that enhances the ride for the child to be seated therein. In one aspect, seat **18a** of the stroller has a bottle holder **110** incorporated therein which is conveniently positioned for access by the child passenger without crowding the child or requiring expansion of the seating area. In particular, bottle holder **110** is positioned in the front facing panel **112** of the seat. In this position any bottle contained in holder **110** will be located between the child's legs, which is an area normally open, as the child tends to rest its legs against the sides of the seat. Of course depending on the size of the seat, the bottle holder could be located in the top support area of the seat at its front edge. The bottle holder can be formed of an desired material and be incorporated into the seat in any desired way, as by sewing, adhesives or polymeric welding. However, preferably the bottle holder is formed of a flexible material such as mesh or materials useful for stroller coverings and is sewn into position. A thermo-insulative lining can be used, if desired.

In another aspect, the trailer includes a sunshade **116** including a visor **118**. The visor includes a stiffening member **120** which maintains the visor in a lowered, forward in-use position. The stiffening member prevents the main portion of the visor from flapping in the breeze generated from pushing the stroller, especially at high, for example jogging, speeds. Preferably stiffening member **120** can be adjusted, arrow F, between the in-use position and a stored position shown in phantom as **120'**. In one embodiment, stiffening member **120** is formed of a pliant material to which force can be applied to move the visor between the two positions. In another embodiment, the visor is formed of a stiff material such a tinted translucent polymeric material mounted to spring between the stored configuration and the in-use configuration. In the illustrated embodiment, the stiffening member is a spring steel wire and is mounted in a pocket **124** formed adjacent the edge of the visor. Force applied to the wire can spring the visor between the two positions.

The visor can be formed of any desired opaque, translucent or clear materials and can be attached to the stroller in any desired way, as by welding, sewing or adhesives.

It will be apparent that many other changes may be made to the illustrative embodiments, while falling within the scope of the invention and it is intended that all such changes be covered by the claims appended hereto.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

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1. A stroller having a forward end and a rear end and a long axis extending through the forward end and the rear end, the stroller comprising: a plurality of wheels for supporting the stroller including at least one front wheel positioned forward of the stroller's centre of gravity and rear wheels; a frame supported by the wheels having main frame members including (a) front wheel supports for engaging the at least one front wheel, (b) a handle bar for grasping and moving the stroller and (c) rear supports securing and extending upwardly from the rear wheels; a seat supported by the frame and a flexible, elongate cross member extending to act between at least two of the main frame members to control the spacing between the main frame members.

2. The stroller of claim 1 wherein the flexible elongate cross member is substantially inextensible.

3. The stroller of claim 1 wherein the flexible elongate cross member has a capability of limited stretch under loads beyond a selected level to provide a suspension effect.

4. The stroller of claim 1 wherein the flexible elongate cross member is secured in fixed positions on the at least two main frame members between which it extends.

5. The stroller of claim 1 further comprising a mechanism for adjusting the length of the flexible elongate cross member to control the spacing between the at least two main frame members.

6. The stroller of claim 5 wherein the mechanism for adjusting the length of the flexible elongate cross member is operable to adjust the length while the flexible elongate cross member remains extended between the at least two main frame members.

7. The stroller of claim 1 wherein the flexible elongate cross member is secured to a part connected to a main frame member.

8. The stroller of claim 7 wherein the part includes a mechanism for adjusting the extended length between the at least two main frame members.

9. The stroller of claim 8 wherein the mechanism for adjusting the extended length is operable to adjust the length while the flexible elongate cross member remains extended between the at least two main frame members.

10. The stroller of claim 1 further comprising a tension adjustment means for selecting the tension in the flexible elongate cross member as it extends between the main frame members.

11. The stroller of claim 1 wherein the flexible elongate cross member is included in an over-center mechanism for providing frame rigidity between the at least two main frame members.

12. The stroller of claim 1 wherein the flexible elongate cross member acts between the front wheel supports and the rear supports to limit the spacing therebetween.

13. A stroller having a forward end and a rear end and a long axis extending through the forward end and the rear end, the stroller comprising:

a plurality of wheels for supporting the stroller including at least one front wheel positioned forward of the stroller's centre of gravity, a left rear wheel and a right rear wheel; a frame supported by the wheels and configurable into an upright position for use, the frame including front wheel supports securing and extending rearwardly from the at least one front wheel, a handle bar for grasping and moving the stroller, a left rear support securing and extending upwardly from the left rear wheel and a right rear support securing and extending upwardly from the right rear wheel; a seat supported by the frame; and a relative wheel positioning means for selecting and maintaining the spacing of the

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at least one front wheel relative to at least one of the left rear wheel and the right rear wheel when the frame is in the upright position.

14. The stroller of claim 13 wherein the stroller includes a front wheel and the relative wheel positioning means includes a mechanism for adjusting the spacing between the front wheel and each of the left and right rear wheels.

15. The stroller of claim 13 wherein the stroller includes right-side front and rear wheels and left-side front and rear wheels, and the relative wheel positioning means includes a mechanism for adjusting the spacing between the right-side front and rear wheels and the left-side front and rear wheels.

16. The stroller of claim 13 wherein the relative wheel positioning means is two elongate members each one extending to act between the front wheel supports and one of the rear supports to control the spacing therebetween.

17. The stroller of claim 16 wherein the elongate members are substantially inextensible.

18. The stroller of claim 16 further comprising a mechanism for adjusting the length of each elongate member.

19. The stroller of claim 18 wherein the mechanism is operable to adjust the length while the elongate members remain extending between the front wheel supports and the rear wheel supports.

20. The stroller of claim 16 wherein the elongate members each include a flexible elongate portion.

21. The stroller of claim 18 wherein the elongate members each include a flexible elongate portion.

22. A stroller having a forward end and a rear end and a long axis extending through the forward end and the rear end, the stroller comprising:

a plurality of wheels for supporting the stroller including at least one front wheel positioned forward of the stroller's centre of gravity, a left rear wheel and a right rear wheel; a frame supported by the wheels including front wheel supports securing and extending rearwardly from the at least one front wheel, a left rear support securing and extending upwardly from the left rear wheel, a right rear support securing and extending upwardly from the right rear wheel, and a handle bar for grasping and moving the stroller including a gripping portion, the handle bar being connected into the frame by a pivotal connection and the pivotal connection being incorporated into a lever mechanism for driving the handle bar against a fulcrum to permit handle height adjustment with respect to the stroller, the mechanism for handle height adjustment including: a slot on the frame; a pin secured to the handle and slidably engaged in the slot, the pin being slideably moveable in the slot between a first position and a second position to drive the handle bar against the fulcrum such that the gripping portion of the handle bar is moved into a higher position when the pin is in the first position and the gripping portion of the handle bar is in a lower position when the pin is in the second position; and a releasable lock to maintain the pin in the first position or the second position during use; and a seat supported by the frame.

23. The stroller of claim 22 wherein the slot is formed as an arc and the first position and the second position are the ends of the slot and the lock is a mechanism for driving the pin against the ends of the slot.

24. A stroller having a forward end and a rear end and a long axis extending through the forward end and the rear end, the stroller comprising:

a plurality of wheels for supporting the stroller including at least one front wheel positioned forward of the

stroller's centre of gravity and rear wheels; a frame supported by the wheels having main frame members including front wheel supports for engaging the at least one front wheel, a handle bar for grasping and moving the stroller and rear wheel supports for engaging the rear wheels; a seat supported by the frame; a connecting bracket on each side of the frame having connected thereto the main frame members and at least two of the main frame members being pivotally moveable at their connection to the connecting brackets and the connecting bracket positioned to permit the at least two main frame members to pivot about the connecting bracket such that the stroller can be manipulated between an upright position and a folded position; and a locking means for releasably locking the stroller in the upright position, the locking means selected such that its operation controls pivoting of both of the at least two frame members.

25. The stroller of claim 24 wherein the front wheel supports are rigidly connected to the connecting brackets, while the handle and rear wheel supports are pivotally connected to the connecting brackets.

26. The stroller of claim 25 wherein the connecting bracket includes a mechanism for handle height adjustment.

27. The stroller of claim 26 wherein the mechanism for handle height adjustment is incorporated into the handles pivotal connection to the connecting bracket.

28. The stroller of claim 24 wherein the locking means acts to control pivoting of the handle bar and the rear wheel supports.

29. The stroller of claim 24 wherein the locking means includes a cable and an over-center clamp to draw the cable into a tensioned configuration between the at least two main frame members to restrain them against pivoting.

30. The stroller of claim 24 wherein the locking means includes a cable on each side of the stroller and an over-center clamp extending therebetween, the cables being clampable in a tensioned configuration to lock the at least two main frame members against pivoting.

31. The stroller of claim 30 wherein the cable is connected between the handle bar and the over-center clamp and the over-center clamp is connected to one of the rear supports on each side, such that the cables can be tensioned to draw and lock the handle bar and the rear supports against stops.

32. The stroller of claim 31 wherein the over-center clamp is driven to draw the cables into the tensioned configuration by rotating it downwardly toward the rear wheels.

33. The stroller of claim 24 wherein the locking means is actuated to automatically lock as the stroller is unfolded.

34. The stroller of claim 33 wherein the locking means includes a cable on each side of the stroller and an over-center clamp extending therebetween, the cables being clampable by the over-center clamp into a tensioned configuration to lock the at least two main frame members against pivoting, the over-center clamp being drawn to over-center as the stroller is unfolded.

35. The stroller of claim 24 further comprising a second lock for releasably locking the locking means into a locked configuration.

36. A stroller having a forward end and a rear end and a long axis extending through the forward end and the rear end, the stroller comprising: a plurality of wheels for supporting the stroller including at least one front wheel posi-

tioned forward of the stroller's center of gravity and rear wheels; a frame supported by the wheels having main frame members including (a) front wheel supports for engaging the at least one front wheel, (b) a handle bar for grasping and moving the stroller and (c) rear supports securing and extending upwardly from the rear wheels; a seat supported by the frame and a flexible, elongate cross member extending to act between at least two of the main frame members to control the spacing between the main frame members, the flexible elongate cross member being secured to a part connected to a main frame member, the part including a mechanism for adjusting the extended length between the at least two main frame members.

37. The stroller of claim 36 wherein the mechanism for adjusting the extended length is operable to adjust the length while the flexible elongate cross member remains extended between the at least two main frame members.

38. A stroller having a forward end and a rear end and a long axis extending through the forward end and the rear end, the stroller comprising: a plurality of wheels for supporting the stroller including at least one front wheel positioned forward of the stroller's center of gravity and rear wheels; a frame supported by the wheels having main frame members including (a) front wheel supports for engaging the at least one front wheel, (b) a handle bar for grasping and moving the stroller and (c) rear supports securing and extending upwardly from the rear wheels; a seat supported by the frame; a flexible, elongate cross member extending to act between at least two of the main frame members to control the spacing between the main frame members; and a tension adjustment means for selecting the tension in the flexible elongate cross member as it extends between the main frame members.

39. A stroller having a forward end and a rear end and a long axis extending through the forward end and the rear end, the stroller comprising: a plurality of wheels for supporting the stroller including at least one front wheel positioned forward of the stroller's center of gravity, a left rear wheel and a right rear wheel; a frame supported by the wheels including front wheel supports securing and extending rearwardly from the at least one front wheel, a left rear support securing and extending upwardly from the left rear wheel, a right rear support securing and extending upwardly from the right rear wheel; and a handle bar for grasping and moving the stroller including a gripping portion, the handle bar being connected into the frame by a pivotal connection including a pin connected to the handle bar; a seat supported by the frame and a mechanism for handle height adjustment with respect to the stroller including a slot on the frame, the pin being engaged and slideably moveable in the slot between a first position and a second position to drive the handle bar against a fixed fulcrum such that the gripping portion of the handle bar is moved into a higher position when the pin is in the first position and the gripping portion of the handle bar is in a lower position when the pin is in the second position and a releasable lock to maintain the pin in the first position or the second position during use.

40. The stroller of claim 39 wherein the slot is formed as an arc and the first position and the second position are the ends of the slot and the lock is a mechanism for driving the pin against the ends of the slot.

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