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DESCRIPTION

STROLLER

5 TECHNICAL FIELD

The present invention relates to a highly rigid and foldable stroller.

BACKGROUND ART

10 There have been proposed various folding strollers for carrying a baby outdoors for walking or shopping, capable of being folded to facilitate storing and carrying.

 In the conventional stroller, a plane including a front leg holding a wheel or a caster on its lower end and a rear
15 leg holding a wheel or a caster on its lower end is vertical to the ground as viewed in a front elevation. Consequently, the stroller has a low rigidity to withstand a transverse force and hence the stroller is unable to move stably. A folding stroller capable of being folded in three so as to
20 reduce its width, in particular, has a low rigidity because the folding stroller has many pivotal joints. If the rigidity of the body of the folding stroller is increased, the weight of the folding stroller increases unavoidably, the folding stroller requires many folding operations, and the stroller
25 becomes inconvenient to use.

DISCLOSURE OF THE INVENTION

 The present invention has been made in view of such problems and it is therefore an object of the present invention
30 to provide a stroller having a high rigidity and capable of being folded up by simple folding operations.

 According to the present invention, a stroller comprises: a U-shaped handle; a pair of armrests pivotally joined to the handle; a pair of front legs pivotally joined
35 to the armrests, respectively; a pair of rear legs pivotally joined to the armrests, respectively; front wheels held on lower end parts of the front legs, respectively; and rear

wheels held on lower end parts of the rear legs, respectively; wherein the pair of front legs are set so as to extend obliquely away from each other toward the front wheels, and the pair of rear legs are set so as to extend obliquely away from each other toward the rear wheels.

The stroller according to the present invention is characterized in that the pair of front legs are connected by an x-shaped linkage.

The stroller according to the present invention is characterized in that the x-shaped linkage is connected to the pair of front legs and lower end parts of the handle.

The stroller according to the present invention is characterized in that the x-shaped linkage is extended obliquely downward from the pair of front legs toward the lower end parts of the handle.

The stroller according to the present invention is characterized in that the pair of front legs and the handle are connected by a pair of connecting bars, and the pair of front legs are connected through the connecting bars to the x-shaped linkage.

The stroller according to the present invention is characterized in that the pair of connecting bars are connected by an intermediate stay, the pair of front legs are connected by a footrest, and the intermediate stay and the footrest have bendable middle parts, respectively.

The stroller according to the present invention is characterized in that the pair of connecting bars are connected to the footrest by connecting rods.

The stroller according to the present invention is characterized in that each of the front wheels is supported by the corresponding front leg through a swivel structure capable of turning relative to the front wheel.

The stroller according to the present invention is characterized in that the front wheels are of double-wheel construction.

The stroller according to the present invention is characterized in that an axle-holding member is mounted on

the axle of each front wheel, and the swivel structure is capable of turning on the axle-holding member.

The stroller according to the present invention is characterized in that each of the swivel structure has a support
5 part extending perpendicularly to the axis of the front wheel in a moving direction, and a connecting part that turns on the arm part.

BRIEF DESCRIPTION OF THE DRAWINGS

10 Fig. 1 is a front elevation of a stroller in a preferred embodiment according to the present invention in an unfolded state;

Fig. 2 is a side elevation of the stroller of the present invention in an unfolded state;

15 Fig. 3 is a fragmentary perspective view of the stroller of the present invention in an unfolded state;

Fig. 4 is a side elevation of the stroller of the present invention in a folded state;

20 Fig. 5 is a front elevation of the stroller of the present invention in a folded state;

Fig. 6A is a sectional view of a front wheel support mechanism for supporting a front wheel on a front leg of the stroller of the present invention in a state where the stroller is unfolded;

25 Fig. 6B is a sectional view of a front wheel support mechanism for supporting the front wheel on the front leg in a state where the stroller is folded;

30 Fig. 7A is a partly longitudinally sectional front elevation of another front wheel support mechanism for supporting the front wheel on the front leg; and

Fig. 7B is a partly longitudinally sectional side elevation of the front wheel support mechanism shown in Fig. 7A.

BEST MODE FOR CARRYING OUT THE INVENTION

Preferred embodiments of the present invention will be described with reference to the accompanying drawings.

Figs. 1 and 2 are a front elevation and a side elevation, respectively, of a stroller in a preferred embodiment according to the present invention. The stroller has a pair of front legs 12 each provided with a front wheel 11 of double-wheel construction including a pair of wheels 11a, a pair of rear legs 14, each provided with a rear wheel 13, a handle of a shape substantially resembling the inverted letter U having right and left side legs 15a, a pair of armrests 16, and a guard arm, not shown, extended between the armrests 16 and detachably joined to the armrests 16.

The armrests 16 have rear end parts pivotally joined to the right and the left side leg 15a of the handle 15, respectively. The upper ends of the front legs 12 are pivotally joined to middle parts of the right and the left armrest 16, respectively. The rear legs 14 have upper end parts extended across upper end parts of the front legs 12, and have upper ends pivotally joined to parts of the armrests 16 on the front side of parts of the armrests 16 to which the upper end of the front legs 12 are pivotally joined. As best shown in Fig. 1, the right and the left front leg 12 are set so as to extend obliquely away from each other toward the front wheels 11 such that the distance between lower parts of the front legs 12 is greater than that between upper parts of the same as viewed from the front. Similarly, the rear legs 14 are set so as to extend obliquely away from each other toward the rear wheels 13.

The upper ends of the rear legs 14 are pivotally joined to the parts of the armrests 16 on the front side of the parts of the armrests 16 to which the upper ends of the front legs 12 are pivotally joined in this embodiment. However, the upper ends of the rear legs 14 may be pivotally joined to parts of the armrests 16 on the rear side of the parts to which the upper ends of the front legs 12 are pivotally joined or the upper ends of the front legs 12 and those of the rear legs 14 may be coaxially pivotally joined to the armrests 16.

Each of brackets 17 has one end joined pivotally to a

part of the side leg 15a of the handle 15 near the lower end of the side leg 15a and the other end pivotally joined to a middle part of the rear leg 14. When the stroller is in an unfolded state as shown in Fig. 2, the rear legs 14 engage
5 in longitudinal grooves 17a of the brackets 17, respectively, so that the rear legs 14 are held firmly in place.

Each of connecting bars 18 has a front end pivotally joined to the front leg 12 and the other end pivotally joined to the side leg 15a of the handle 15. An intermediate stay
10 19 has opposite ends connected to the right and the left connecting bar 18, respectively. The intermediate stay 19 is provided in its middle part with a hinge 20 that allows the intermediate stay 19 to be bent so that parts of the intermediate stay 19 on the opposite sides of the hinge 20
15 extend upward. The opposite ends of the intermediate stay 19 is pivotally joined to the connecting bars 18 with pins 21, respectively. The footrest 22 has opposite ends pivotally joined to the right and the left front leg 12 with pins 23, respectively. The footrest 22 is provided in its middle part
20 with a hinge 24 that allows the footrest 20 to be bent so that parts of the footrest 20 on the opposite sides of the hinge 24 extend upward.

The front legs 12 and the handle 15 are connected by an x-shaped linkage 25 that slopes down toward the rear when
25 the stroller is unfolded. The x-shaped linkage 25 has two links 25a and 25b extending across each other and having pivotally joined substantially middle parts. Lower ends of the links 25a and 25b are pivotally joined to connecting members 26 joined to the lower ends of the side legs 15a of the handle
30 15.

A flexible member or a pivotal joint is inserted in a middle part of a horizontal part of the handle 15 to allow the horizontal part to bend to some extent.

Fig. 3 shows the connecting bars 18, the intermediate
35 stay 19, the footrest 22 and the x-shaped linkage 25 in a perspective view. Parts near the opposite ends of the footrest 22 are connected to the front ends of the connecting bars

18 by connecting rods 27, respectively.

When the handle 15 is pulled rearward and pushed down to fold the stroller in the unfolded state shown in Fig. 2, the brackets 17 turn clockwise, as viewed in Fig. 2, on joints
5 pivotally joining the brackets 17 to the handle 15, and the handle 15 moves down relative to the rear legs 14. Consequently, the armrests 16 and the connecting bars 18 are turned upward on joints pivotally joining the armrest 16 and the connecting bars 18 to the handle 15, the rear wheels 13 approach the
10 front wheels 11, and the size of the stroller in a direction from the front to the rear is reduced as shown in Fig. 4. As the connecting bars 18 are thus turned, the x-shaped linkage 25 contracts so that the width thereof decreases. Consequently, the front legs 12, the side legs 15a of the
15 handle 15, and the rear legs 14 approach each other, respectively, so that the lateral size of the stroller is reduced. As the x-shaped linkage 25 contracts, the intermediate stay 19 bends upward convexly. Then, the footrest 22 is pulled upward by the connecting rods 27. As
20 the front legs 12 approaches each other, the footrest 22 is bent upward convexly. Thus, the legs can be made to approach each other without hindrance. Figs. 4 and 5 are a side elevation and a front elevation, respectively, of the folded stroller.

25 The handle 15 is raised and the horizontal part of the handle 15 is pulled rearward to unfold the folded stroller. In this case, the right and the left legs 12, 14 move away from each other, the front wheels 11 and the rear wheels 13 move away from each other to positions shown in Fig. 2. In
30 the state shown in Fig. 2, the rear legs 14 are engaged in the grooves 17a of the brackets 17 to fix the rear legs 14 relative to the handle 15.

Since the front legs 12 extend obliquely away from each other toward the front wheels 11, and the rear legs 14 also
35 extend obliquely away from each other toward the rear wheels 13 as viewed from the front, transverse forces that push the right and the left legs 12, 14 away from each other, act on

the right and the left legs 12, 14 when the stroller is loaded. Therefore, tensile forces act on the intermediate stay 19, the footrest 22 and the x-shaped linkage 25, so that the framing of the stroller can be stable and the stroller is able to smoothly move. The intermediate stay 19 and the x-shaped linkage 25 connecting the right and the left legs 12, 14 bear transverse and vertical forces and strengthen the framing of the stroller.

The stroller needs only to be tilted and depressed in order to fold the stroller, the stroller can be folded by a series of operations with holding the stroller with hands, and any complicated operating members does not need to be incorporated in the handle 15.

Although the footrest 22 is urged in the folding direction by the connecting rods 27 in this embodiment, the footrest 22 may be continuously urged in the folding direction by a spring or the like.

As mentioned above, the pair of front legs 12 are set so as to extend obliquely away from each other toward the front wheels 11, and the pair of rear legs 14 are set so as to extend obliquely away from each other toward the rear wheels 13 in the stroller of the present invention. Therefore, it appears that the wheels 11a of the front wheels 11 are tilted with respect to the ground G and the wheels 11a are unable to roll along the ground when the stroller is folded, when the front wheels 11 are held such that the wheels 11a are perpendicular to the ground when the stroller is unfolded as shown in Fig. 1. To avoid such a problem, axles 31 supporting the wheels 11a are supported so as to be tiltable relative to the legs 12, and are pressed downward by springs or the like, respectively, so that the wheels 11a are always perpendicular to the ground G.

A swivel structure 30 holding the front wheel 11 is attached to the lower end of each front leg 12. The axis 30a is inclined to the axis 12a of the front leg 12 such that a plane including the axis 30a of the swivel structure 30 is perpendicular to the ground G when the stroller is unfolded

for use as shown in Fig. 1. The plane including the axis 30a of the swivel structure 30 is tilted to the ground G when the stroller is folded as shown in Fig. 5. Figs. 6A and 6B show a wheel holding mechanism included in the front wheel 11. The axle 31 is extended through the swivel structure 30 attached to the lower end of the front leg 12, and wheels 11a are supported for rotation on opposite end parts of the axle 31, respectively. An axle holding member 32 fixedly mounted on the axle 31 is placed in a cavity 30d formed in the swivel structure 30. Vertical slots 30b are formed in the opposite side walls of the swivel structure 30. The axle-holding member 32 has a substantially circular shape in a cross section taken on a vertical plane including the axis of the axle 31. The axle holding member 32 is seated on the surface of a circular recess 30c formed in the bottom surface of the cavity 30d of the swivel structure 30 and is pressed against the surface of the recess 30c by a spring 33. The opposite end parts of the axle 31 project outside from the swivel body 30 through the slots 30b, and the wheels 11a of the front wheel 11 are supported for rotation on the opposite end parts of the axle 31, respectively.

As shown in Figs. 1 and 6A, the axis of the axle 31 is perpendicular to the axis of the swivel body 30 when the stroller is unfolded, and the right and the left front wheel 11 are perpendicular to the ground. As shown in Fig. 5, the axis 30a of the swivel body 30 is tilted to the ground G when the stroller is folded up. However, the axle 31 moves vertically along the slots 30b of the swivel structure 30 and, eventually, the wheels 11a of each front wheel 11 lie perpendicularly to the ground. Thus, the wheels 11a of the right and the left front wheels 11 are always perpendicular to the ground G and the front wheels 11 are able to roll smoothly either when the stroller is unfolded or when folded up.

The front wheels 11 are accurately fabricated because the front wheels 11 are of double-wheel construction provided with the pair of wheels 11a, and the wheels 11a are always in contact with the ground. Thus, errors introduced into the

stroller during manufacture can be corrected and the quality of the stroller can be improved.

Figs. 7A and 7B show a swivel structure in a modification. As shown in Figs. 7A and 7B, a swivel structure 30 has a connecting part 34 to be connected to the front leg 12, and an axle support part 35 supporting the axle 31. The swivel structure 30 has a shape substantially resembling the letter L. The axle support part 35 is integrally provided with an arm 35a. The arm 35a projects forward perpendicularly to the axis of the axle 31. A lower end part of the connecting part 34 is joined to the arm 35a for turning about the axis of the arm 35a. An upper end part of the connecting part 34 is connected to the front leg 12 so as to be turnable on the axle 31.

When the stroller is unfolded, the connecting part 34 extends substantially vertically as indicated by continuous lines in Fig. 7A, and the front wheel 11 is perpendicular to the ground as shown in Fig. 7A. When the stroller is folded up, the connecting part 34 tilts as indicated by two-dot chain lines in Fig. 7A. In this case, the axle support part 35 turns relative to the connecting part 34 when the front wheel 11 is set on the ground G such that the wheels 11a of the front wheel 11 are set on the ground G perpendicularly to the ground G. Thus, the wheels 11a of the right and the left front wheel 11 are always perpendicular to the ground G and the front wheels 11 are able to roll smoothly either when the stroller is unfolded or when folded up. Since the wheels 11a of the front wheel 11 of double-wheel construction are always in contact with the ground G, errors introduced into the stroller during manufacture can be corrected and the quality of the stroller can be improved.

As apparent from the foregoing description, according to the present invention, the pair of front legs are set so as to extend obliquely away from each other toward the front wheels, and the pair of rear legs are set so as to extend obliquely away from each other toward the rear wheels as viewed from the front. Therefore, transverse forces that push the

right and the left legs away from each other, act on the right and the left legs when the stroller is loaded. Consequently, tensile forces act on the intermediate stay, the footrest and the x-shaped linkage, so that the framing of the stroller is highly rigid. Since the right and the left front leg are connected by the x-shaped linkage, the width of the stroller can be reduced by folding the framing of the stroller in two, the stroller can be folded or unfolded by a series of operations with holding the stroller with hands, and any complicated operating members does not need to be incorporated in the handle.

CLAIMS

1. A stroller comprising:
 - a U-shaped handle;
 - a pair of armrests pivotally joined to the handle;
 - a pair of front legs pivotally joined to the armrests, respectively;
 - a pair of rear legs pivotally joined to the armrests, respectively;
 - front wheels held on lower end parts of the front legs, respectively; and
 - rear wheels held on lower end parts of the rear legs, respectively;
 - wherein the pair of front legs are set so as to extend obliquely away from each other toward the front wheels, and the pair of rear legs are set so as to extend obliquely away from each other toward the rear wheels ; and
- wherein
 - the pair of front legs are connected by an x-shaped linkage.
2. The stroller according to claim 1, wherein
 - the x-shaped linkage is connected to the pair of front legs and lower end parts of the handle.
3. The stroller according to claim 2, wherein
 - the x-shaped linkage is extended obliquely downward from the pair of front legs toward the lower end parts of the handle.
4. The stroller according to claim 1, wherein
 - the pair of front legs and the handle are connected by a pair of connecting bars, and the pair of front legs are connected through the connecting bars to the x-shaped linkage.

5. The stroller according to claim 4, wherein the pair of connecting bars are connected by an intermediate stay, the pair of front legs are connected by a footrest, and the intermediate stay and the footrest have bendable middle parts, respectively.

6. The stroller according to claim 4, wherein the pair of connecting bars are connected to the footrest by connecting rods.

7. The stroller according to claim 1, wherein each of the front wheels is supported by the corresponding front leg through a swivel structure capable of turning relative to the front wheel.

8. The stroller according to claim 7, wherein the front wheels are of double-wheel construction.

9. The stroller according to claim 7, wherein an axle holding member is mounted on an axle included in each front wheel, and the swivel structure is capable of turning on the axle holding member.

10. The stroller according to claim 7, wherein each of the swivel structure has a support part extending perpendicularly to the axis of the front wheel in a moving direction, and a connecting part that turns on the arm part.