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(54) **FRAME WITH TELESCOPIC CLOSURE, PARTICULARLY FOR PUSHCHAIRS OR THE LIKE**

RAHMEN MIT TELESKOPVERSCHLUSS, INSBESONDERE FÜR KINDERWAGEN ODER  
DERGLEICHEN

STRUCTURE A FERMETURE TELESCOPIQUE, DESTINEE EN PARTICULIER A DES  
POUSSETTES OU A DES PRODUITS IDENTIQUES

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## Description

### Technical Field

**[0001]** The present invention relates to a frame with telescopic closure, particularly for pushchairs or the like.

### Background Art

**[0002]** Pushchairs are currently widely used being provided with a frame with telescopic closure, which can be folded also along its height so as to assume a very limited size once folded.

**[0003]** These frames are usually formed by two front posts and two rear posts, which are associated in a downward region with respective wheels and are kinematically connected to each other by way of articulation structures, and by two upper posts that act as handles (commonly known as handle tubes), each of which slidingly engages a respective seat that is generally provided on the articulation structures in order to be able to pass from an extended position for use to a retracted folding position, by way of a downward translational motion.

**[0004]** Pushchairs are also currently commercially available being provided with a seat, which is provided with a back that has, at its sides, lateral wings, usually made of fabric, that are designed to be coupled to the handle tubes in order to achieve the dual advantage of a "sleep" configuration, i.e., in which the back is lowered, said configuration being more protected thanks to the covering action performed by such lateral wings, and of an adjustment of the back, which is achieved by using the coupling of the back to the handle tubes by means of strap systems that are integrated in the seat and are structurally far simpler, lighter, and more inexpensive than conventional adjustment systems that provide for racks and rigid back structures.

**[0005]** However, seats of this type cannot be applied to frames with telescopic closure, since the coupling of the lateral wings to the handle tubes would hinder free translational motion of the handle tubes during folding of the pushchair. FR 2 777 253 shows such a pushchair, and can be considered as being the closest prior art.

### Disclosure of the Invention

**[0006]** The aim of the present invention is to provide a valid solution to the technical problem described above by providing a frame with telescopic closure particularly for pushchairs or the like, to which it is possible to apply a back of the type described above provided with lateral wings.

**[0007]** Within this aim, an object of the present invention is to provide a frame with telescopic closure that has a very simple structure so as to be competitive from the economical standpoint.

**[0008]** Another object of the present invention is to provide a frame with telescopic closure that is easy and prac-

tical to use.

**[0009]** This aim and these and other objects that will become better apparent hereinafter are achieved by a frame with telescopic closure particularly for pushchairs or the like according to the invention, comprising two front posts and two rear posts that are connected in a downward region to respective wheels and are kinematically connected to each other, said frame being provided in an upward region with two handle posts movable with respect to said front posts and said rear posts in order to pass from an extended active position to a retracted folding position, characterized in that it comprises two upper auxiliary posts, each of which is connected rigidly to a respective handle post and has at least one engagement portion for a corresponding lateral covering wing that is connected to a corresponding side of the back of a seat that is supported by said frame.

### Brief Description of the Drawings

**[0010]** Further characteristics and advantages of the invention will become better apparent from the description of some preferred but not exclusive embodiments of a frame with telescopic closure particularly for pushchairs or the like according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a perspective view of the frame according to the invention, with parts shown only partially and other parts omitted;

Figure 2 is a partial perspective view of the frame according to the invention during folding;

Figure 3 is a front elevation view of the frame according to the invention in the folded condition;

Figure 4 is a partial perspective view of the frame according to the invention, with the seat shown separate for the sake of greater clarity, and with one mode of coupling of the upper auxiliary posts to the respective handle posts;

Figure 5 is a partial perspective view of one of the handle posts in association with an articulation element that is connected to one of the front posts and to one of the rear posts, and of one of the upper auxiliary posts in a possible embodiment;

Figure 6 is a side elevation view of the frame according to the invention;

Figure 7 is a side elevation view of the frame according to the invention during folding;

Figure 8 is a side elevation view of the frame according to the invention in the folded condition.

### Ways of carrying out the Invention

**[0011]** In the examples of embodiment that follow, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other examples of embodi-

ments.

**[0012]** With reference to the figures, the frame with telescopic closure particularly for pushchairs or the like according to the invention, generally designated by the reference numeral 1, comprises two front posts 2a and 2b and two rear posts 3a and 3b, which are associated in a downward region with respective wheels 4.

**[0013]** The front posts 2a and 2b are kinematically connected by respective articulation elements 5a and 5b to the rear posts 3a and 3b respectively.

**[0014]** Each one of the articulation elements 5a and 5b is constituted by a main body 6, to which the upper ends of the front posts 2a and 2b and of the rear posts 3a and 3b are articulated on opposite sides.

**[0015]** The articulation elements 5a and 5b further perform the additional task of slidingly supporting respective handle posts 7a and 7b, which are arranged substantially in the region of the frame 1 that lies upward during use and end in an upward region with a portion that can be gripped by the user.

**[0016]** Thanks to the sliding coupling with the articulation elements 5a and 5b, the handle posts 7a and 7b can move with respect to the front posts 2a and 2b and to the rear posts 3a and 3b in order to pass from an extended active position to a retracted folded position.

**[0017]** In practice, respective supporting seats 8a and 8b are provided at both of the articulation elements 5a and 5b and slidingly engage and guide the handle posts 7a and 7b respectively.

**[0018]** The handle posts 7a and 7b and the front posts 2a and 2b may further be connected by way of linkages 100 at their ends that are arranged downward during use.

**[0019]** According to the invention two upper auxiliary posts 9a and 9b are provided that are rigidly associated with the handle posts 7a and 7b respectively.

**[0020]** According to the invention, each one of said upper auxiliary posts 9a and 9b has at least one engagement portion, which is adapted to be engaged by a corresponding lateral covering wing 11 connected to a corresponding side of the back of a seat 12 that is supported by the frame 1.

**[0021]** In particular, the upper auxiliary posts 9a and 9b are conveniently arranged at least partially so that they are substantially parallel and spaced with respect to the respective handle posts 7a and 7b with which they are associated.

**[0022]** In greater detail, each one of said upper auxiliary posts 9a and 9b can advantageously have a lower end that is connected to the respective handle post 7a or 7b and a free upper end portion, substantially at which said engagement portion for the respective lateral covering wing 11 is located.

**[0023]** For example, on the lateral covering wings 11 it is possible to provide sleeves 11 a and 11b that are adapted to be fitted over the upper auxiliary posts 9a and 9b and in practice are inserted therein with their free upper end portion.

**[0024]** In order to avoid any hindrance of the retracting

motion of the handle posts 7a and 7b, the point where the upper auxiliary posts 9a and 9b are connected to the respective handle posts 7a and 7b is advantageously located downward with respect to the articulation elements 5a and 5b, as shown in Figure 5.

**[0025]** In this manner, during folding of the frame 1 the upper auxiliary posts 9a and 9b do not interfere with the articulation elements 5a and 5b and sliding of the handle posts 7a and 7b guided by the supporting seats 8a and 8b is ensured.

**[0026]** With reference to Figures 1 and 2, the upper auxiliary posts 9a and 9b can be connected, at their respective lower end, to blocks 150, which are provided on the handle posts 7a and 7b for merely aesthetic purposes or, as shown in Figure 4, can be fixed to armrests 151, which are rigidly coupled to the handle posts 7a and 7b, or can be fixed directly to the handle posts 7a and 7b as shown in Figure 5.

**[0027]** Conveniently, the rear posts 3a and 3b can be connected by an articulated structure 13 that is known per se and which, by using a double parallelogram, is adapted to allow the umbrella-like folding of the frame 1 in order to ensure its easy transport when not in use.

**[0028]** Furthermore, as shown in Figure 4, there is a stiffening rod 110, which connects the front posts 2a and 2b respectively to the rear posts 3a and 3b and acts as a lower supporting framework for the seat 12. Such stiffening rod 110 is part of the known per se general kinematic layout of telescopic frames.

**[0029]** With reference to Figures 4, 5 and 6, in a currently preferred embodiment the frame 1 is provided with an actuation lever 120 that is located at a rear handle 121 and is adapted to actuate means for locking the frame 1 in an open condition, which are provided with pivots 130 that can slide along the longitudinal axis of the handle posts 7a and 7b and are adapted to engage respective retention hooks 140 that are fitted on the front posts 2a and 2b.

**[0030]** Furthermore, in order to achieve evident advantages in terms of light weight and production cost, in one example of embodiment the front posts 2a and 2b, the rear posts 3a and 3b, the handle posts 7a and 7b and the specific upper auxiliary posts 9a and 9b can be constituted by tubular elements.

**[0031]** Advantageously, the seat 12 can be provided with a low-cost back adjustment system constituted by at least one strap that is fixed at its ends to the upper auxiliary posts 9a and 9b or to the lateral covering wings 11 of the back and is provided with conventional length adjustment means.

**[0032]** From what has been described above it is therefore evident that the invention achieves the intended aim and objects and in particular the fact is stressed that it allows to apply also to telescopic-frame pushchairs seats of the type with a lateral covering on their sides, thanks to the presence of the particular upper auxiliary posts 9a and 9b, which are rigidly coupled to the handle posts 7a and 7b but are not engaged by the articulation elements

5a and 5b and form at least one coupling portion for the lateral covering wings 11, which is located substantially at one of their free end portions, as in the case of the example of the embodiment shown in the figures.

**[0033]** Moreover, it has been noted that during folding of the frame 1 the lateral covering wings 11, by being fixed to the upper auxiliary posts 9a and 9b, move with respect to the front posts 2a and 2b and to the rear posts 3a and 3b and in particular with respect to the articulation elements 5a and 5b, following the folding motion of the handle posts 7a and 7b and maintaining their relative position with respect to them, without however interfering in any way with the articulation elements 5a and 5b.

**[0034]** The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

**[0035]** Thus, for example, one or both of the upper auxiliary posts 9a and 9b can be connected to the respective handle posts 7a and 7b at their upper and lower ends respectively, thus obtaining a substantially central portion of the upper auxiliary posts 9a and 9b that is advantageously parallel and spaced with respect to the respective handle post 7a or 7b and provides one or more engagement portions for the lateral covering wings 11.

**[0036]** Conveniently, also within the scope of this constructive embodiment, in order to allow free translational motion of the handle posts 7a and 7b, the points on the handle posts 7a and 7b at which said upper and lower ends of the auxiliary posts 9a and 9b are fixed are located respectively above and below the corresponding articulation elements 5a and 5b.

**[0037]** According to another embodiment that is conceptually similar to the one described, the upper auxiliary posts 9a and 9b can be connected to the respective handle posts at one of their upper ends, while the engagement portion for the covering wings 11 is formed at a free lower end portion.

**[0038]** In this case, the point where the auxiliary posts 9a and 9b are connected to the handle posts 7a and 7b is conveniently provided above the corresponding articulation elements 5a and 5b.

**[0039]** All the characteristics of the invention described above as advantageous, convenient or the like may also be omitted or be replaced by equivalents.

**[0040]** In practice, the materials used, as well as the contingent shapes and dimensions, may be any according to requirements.

**[0041]** The disclosures in Italian Utility Model Application No. VR2003U000007 from which this application claims priority are incorporated herein by reference.

## Claims

1. A frame with telescopic closure particularly for push-chairs or the like, comprising two front posts (2a, 2b) and two rear posts (3a, 3b) that are connected in a downward region to respective wheels and are kin-

ematically connected to each other by articulation elements (5a, 5b), said frame being provided in an upward region with two handle posts (7a, 7b) movable with respect to said front posts and said rear posts in order to pass from an extended active position to a retracted folding position said handle posts being slidably supported by the articulation elements (5a, 5b), **characterized in that** it comprises two upper auxiliary posts (9a, 9b), each of which is rigidly associated with a respective handle post (7a, 7b) and has at least one engagement portion for a corresponding lateral covering wing (11) that is connected to a corresponding side of the back of a seat (12) that is able to be supported by said frame.

2. The frame according to claim 1, **characterized in that** each one of said upper auxiliary posts is shaped at least partially so that it is substantially parallel and spaced with respect to said respective handle post.

3. The frame according to one or more of the preceding claims, **characterized in that** at least one of said upper auxiliary posts comprises a lower end that is connected to the respective handle post and a free upper end portion, substantially at which said at least one engagement portion is arranged.

4. The frame according to one or more of the preceding claims, **characterized in that** at least one of said upper auxiliary posts has an upper end and a lower end, both of which are connected to the respective handle post, and further comprises a substantially central portion that is spaced and parallel with respect to the respective handle post, said at least one engagement portion being provided substantially at said substantially central portion.

5. The frame according to one or more of the preceding claims, **characterized in that** at least one of said upper auxiliary posts comprises an upper end that is connected to the respective handle post and a free lower end portion, said at least one engagement portion being located substantially thereat.

6. The frame according to one or more of the preceding claims, **characterized in that** it comprises two articulation elements that are interposed between said pair of front posts and said pair of rear posts, each element connecting a respective front post to a respective rear post, each one of said articulation elements slidably supporting a corresponding handle post.

7. The frame according to one or more of the preceding claims, **characterized in that** each one of said articulation elements comprises a main body to which said respective rear post is pivoted, said main body forming a supporting seat that is slidably engaged

by said corresponding handle post.

8. The frame according to claim 3, **characterized in that** the point where said at least one of said upper auxiliary posts is connected to the respective handle post is located in a downward region with respect to the articulation element that supports the respective handle post of said at least one of said upper auxiliary posts.
9. The frame according to claim 4, **characterized in that** the points where said upper end and said lower end are connected to the respective handle post of said at least one of said upper auxiliary posts are located respectively in an upward region and in a downward region with respect to the articulation element that supports the respective handle post of said at least one of said upper auxiliary posts.
10. The frame according to claim 5, **characterized in that** the point where said upper end is connected to the respective handle post of said at least one of said upper auxiliary posts is arranged upward with respect to the articulation element that supports the respective handle post of said at least one of said upper auxiliary posts.
11. The frame according to one or more of the preceding claims, **characterized in that** it comprises an articulated structure that connects said two rear posts and is adapted to allow an umbrella-like folding of said frame.
12. The frame according to one or more of the preceding claims, **characterized in that** said front posts, said rear posts, said handle posts and said upper auxiliary posts are constituted by tubular elements.

#### Patentansprüche

1. Ein Rahmen mit Teleskopverschluss, insbesondere für Kinderwagen oder dergleichen, der zwei vordere Säulen (2a, 2b) und zwei hintere Säulen (3a, 3b) umfasst, die in einem unteren Bereich mit entsprechenden Rädern verbunden sind und die kinematisch durch Gelenkelemente (5a, 5b) miteinander verbunden sind, wobei der Rahmen in einem oberen Bereich mit zwei Griffsäulen (7a, 7b) ausgestattet ist, die im Verhältnis zu den vorderen Säulen und den hinteren Säulen beweglich sind, um von einer ausgefahrenen aktiven Position in eine retrahierte Zusammenklapp-Position zu wechseln, wobei die Griffsäulen verschiebbar von den Gelenkelementen (5a, 5b) gestützt werden; **dadurch gekennzeichnet, dass** er zwei obere Hilfssäulen (9a, 9b) umfasst, von denen jede starr mit einer entsprechenden Griffsäule (7a, 7b) verknüpft ist und mindestens einen

Eingriffsabschnitt für einen entsprechenden seitlichen Deckflügel (11) hat, der mit einer entsprechenden Seite des Rückens eines Sitzes (12) verbunden ist, welcher geeignet ist, um von dem Rahmen gestützt zu werden.

2. Der Rahmen gemäß Anspruch 1, **dadurch gekennzeichnet, dass** jede der oberen Hilfssäulen zumindest teilweise so geformt ist, dass sie im Verhältnis zur entsprechenden Griffsäule im Wesentlichen parallel und beabstandet ist.
3. Der Rahmen gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** mindestens eine der oberen Hilfssäulen ein unteres Ende umfasst, das mit der entsprechenden Griffsäule verbunden ist, und einen freien oberen Endabschnitt, an dem im Wesentlichen der mindestens eine Eingriffsabschnitt angeordnet ist.
4. Der Rahmen gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** mindestens eine der oberen Hilfssäulen ein oberes Ende und ein unteres Ende hat, die beide mit der entsprechenden Griffsäule verbunden sind, und weiter einen im Wesentlichen zentralen Abschnitt umfasst, der im Verhältnis zur entsprechenden Griffsäule beabstandet und parallel ist, wobei der mindestens eine Eingriffsabschnitt im Wesentlichen an dem im Wesentlichen zentralen Abschnitt bereitgestellt wird.
5. Der Rahmen gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** mindestens eine der oberen Hilfssäulen ein oberes Ende umfasst, das mit der entsprechenden Griffsäule verbunden ist, und einen freien unteren Endabschnitt, wobei sich der mindestens eine Eingriffsabschnitt im Wesentlichen daran befindet.
6. Der Rahmen gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** er zwei Gelenkelemente umfasst, die zwischen dem Paar von vorderen Säulen und dem Paar von hinteren Säulen angeordnet sind, wobei jedes Element eine entsprechende vordere Säule mit einer entsprechenden hinteren Säule verbindet, wobei jedes der Gelenkelemente verschiebbar eine entsprechende Griffsäule stützt.
7. Der Rahmen gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** jedes der Gelenkelemente einen Hauptkörper umfasst, an dem die entsprechende hintere Säule drehgelenkig angeordnet ist, wobei der Hauptkörper einen Stützsitz bildet, in welchen die entsprechende Griffsäule verschiebbar eingreift.

8. Der Rahmen gemäß Anspruch 3, **dadurch gekennzeichnet, dass** der Punkt, an welchem die mindestens eine der oberen Hilfssäulen mit der entsprechenden Griffsäule verbunden ist, sich in einem unteren Bereich im Verhältnis zu dem Gelenkelement befindet, das die jeweilige Griffsäule der mindestens einen der oberen Hilfssäulen stützt.
9. Der Rahmen gemäß Anspruch 4, **dadurch gekennzeichnet, dass** die Punkte, an denen das obere Ende und das untere Ende mit der entsprechenden Griffsäule der mindestens einen der oberen Hilfssäulen verbunden sind, sich in einem oberen Bereich beziehungsweise in einem unteren Bereich im Verhältnis zu dem Gelenkelement befinden, das die entsprechende Griffsäule der mindestens einen der oberen Hilfssäulen stützt.
10. Der Rahmen gemäß Anspruch 5, **dadurch gekennzeichnet, dass** der Punkt, an dem das obere Ende mit der entsprechenden Griffsäule der mindestens einen der oberen Hilfssäulen verbunden ist, nach oben in Bezug zum Gelenkelement angeordnet ist, das die entsprechende Griffsäule der mindestens einen der oberen Hilfssäulen stützt.
11. Der Rahmen gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** er eine Gelenkstruktur umfasst, die die beiden hinteren Säulen verbindet und ausgebildet ist, um ein schirmähnliches Klappen des Rahmens zu ermöglichen.
12. Der Rahmen gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** die vorderen Säulen, die hinteren Säulen, die Griffsäulen und die oberen Hilfssäulen aus rohrförmigen Elementen bestehen.

## Revendications

1. Châssis avec fermeture télescopique en particulier pour poussettes ou analogues, comprenant deux montants frontaux (2a, 2b) et deux montants arrières (3a, 3b) qui sont reliés dans une région vers le bas à des roues respectives et sont reliés de façon cinématique entre eux par des éléments d'articulation (5a, 5b), ledit châssis étant muni dans une région vers le haut de deux montants poignée (7a, 7b) mobiles par rapport auxdits montants frontaux et auxdits montants arrières afin de passer d'une position étendue active à une position rétractée de repli, lesdits montants poignée étant supportés de façon coulissante par les éléments d'articulation (5a, 5b), **caractérisé en ce qu'il** comprend deux montants supérieurs auxiliaires (9a, 9b), chacun desquels est associé de façon rigide avec un montant poignée respectif (7a, 7b) et présente au moins une partie d'engagement pour une aile (11) de recouvrement latérale correspondante qui est reliée à un côté correspondant du dossier d'un siège (12) qui est apte à être supporté par ledit châssis.
2. Châssis selon la revendication 1, **caractérisé en ce que** chacun desdits montants supérieurs auxiliaires est formé au moins partiellement de sorte à être sensiblement parallèle et espacé par rapport audit montant poignée respectif.
3. Châssis selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** au moins l'un desdits montants supérieurs auxiliaires comprend une extrémité inférieure qui est reliée au montant poignée respectif et une partie d'extrémité supérieure libre, sensiblement au niveau de laquelle ladite au moins une partie d'engagement est agencée.
4. Châssis selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** au moins l'un desdits montants supérieurs auxiliaires présente une extrémité supérieure et une extrémité inférieure, toutes les deux reliées au montant poignée respectif, et comprend en outre une partie sensiblement centrale qui est espacée et parallèle par rapport au montant poignée respectif, ladite au moins une partie d'engagement étant prévue sensiblement au niveau de ladite partie sensiblement centrale.
5. Châssis selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** au moins l'un desdits montants supérieurs auxiliaires comprend une extrémité supérieure qui est reliée au montant poignée respectif et une partie d'extrémité inférieure libre, ladite au moins une partie d'engagement étant située sensiblement au niveau de celle-ci.
6. Châssis selon une ou plusieurs des revendications précédentes, **caractérisé en ce qu'il** comprend deux éléments d'articulation qui sont interposés entre ladite paire de montants frontaux et ladite paire de montants arrières, chaque élément reliant un montant frontal respectif à un montant arrière respectif, chacun desdits éléments d'articulation supportant de façon coulissante un montant poignée correspondant.
7. Châssis selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** chacun desdits éléments d'articulation comprend un corps principal auquel est articulé ledit montant arrière respectif, ledit corps principal formant un siège de support qui est engagé de façon coulissante par ledit montant poignée correspondant.
8. Châssis selon la revendication 3, **caractérisé en ce que** le point où ledit au moins l'un desdits montants

supérieurs auxiliaires est relié au montant poignée respectif est situé dans une région vers le bas par rapport à l'élément d'articulation qui supporte le montant poignée respectif dudit au moins un desdits montants supérieurs auxiliaires.

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9. Châssis selon la revendication 4, **caractérisé en ce que** les points où ladite extrémité supérieure et ladite extrémité inférieure sont reliées au montant poignée respectif dudit au moins un desdits montants auxiliaires supérieurs sont situés respectivement dans une région en amont et dans une région en aval par rapport à l'élément d'articulation qui supporte le montant poignée respectif dudit au moins un desdits montants auxiliaires supérieurs.
10. Châssis selon la revendication 5, **caractérisé en ce que** le point où ladite extrémité supérieure est reliée au montant poignée respectif dudit au moins un desdits montants auxiliaires supérieurs est agencé en aval par rapport à l'élément d'articulation qui supporte le montant poignée respectif dudit au moins un desdits montants auxiliaires supérieurs.
11. Châssis selon une ou plusieurs des revendications précédentes, **caractérisé en ce qu'**il comprend une structure articulée qui relie lesdits deux montants arrières et qui est adaptée pour permettre un pliage de type parapluie dudit châssis.
12. Châssis selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** lesdits montants frontaux, lesdits montants arrière, lesdits montants poignée et lesdits montants supérieurs auxiliaires sont constitués par des éléments tubulaires.

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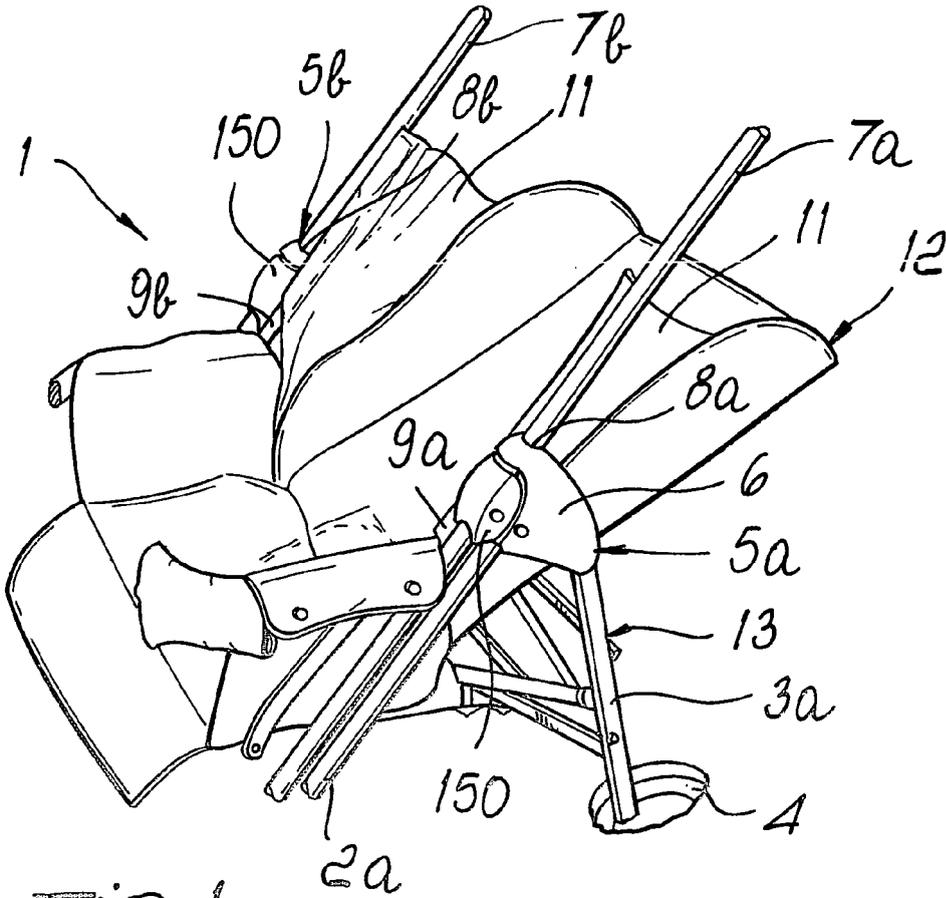


Fig. 1

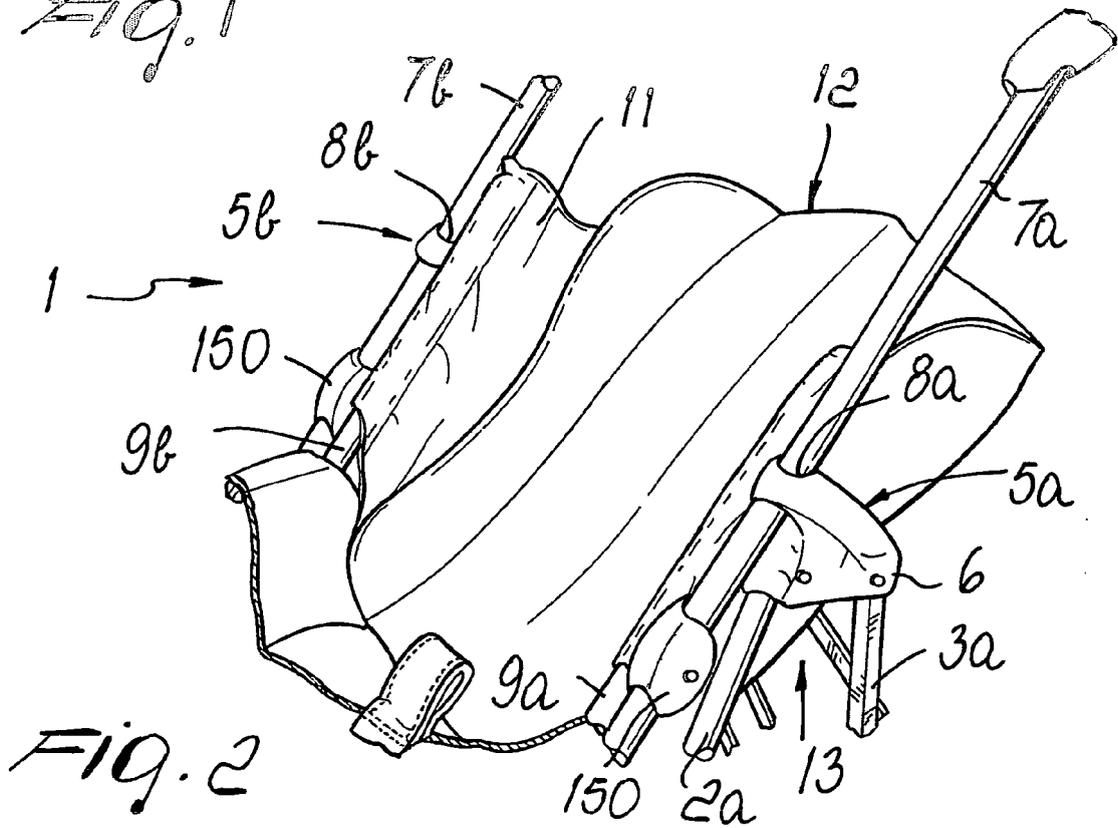
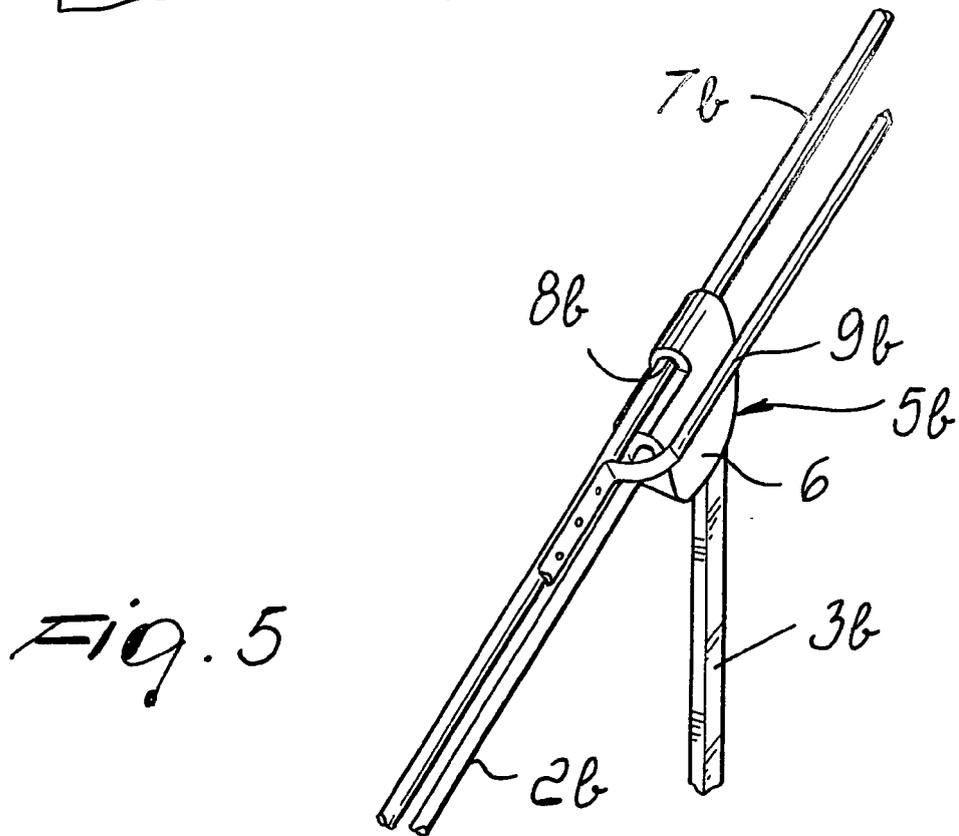
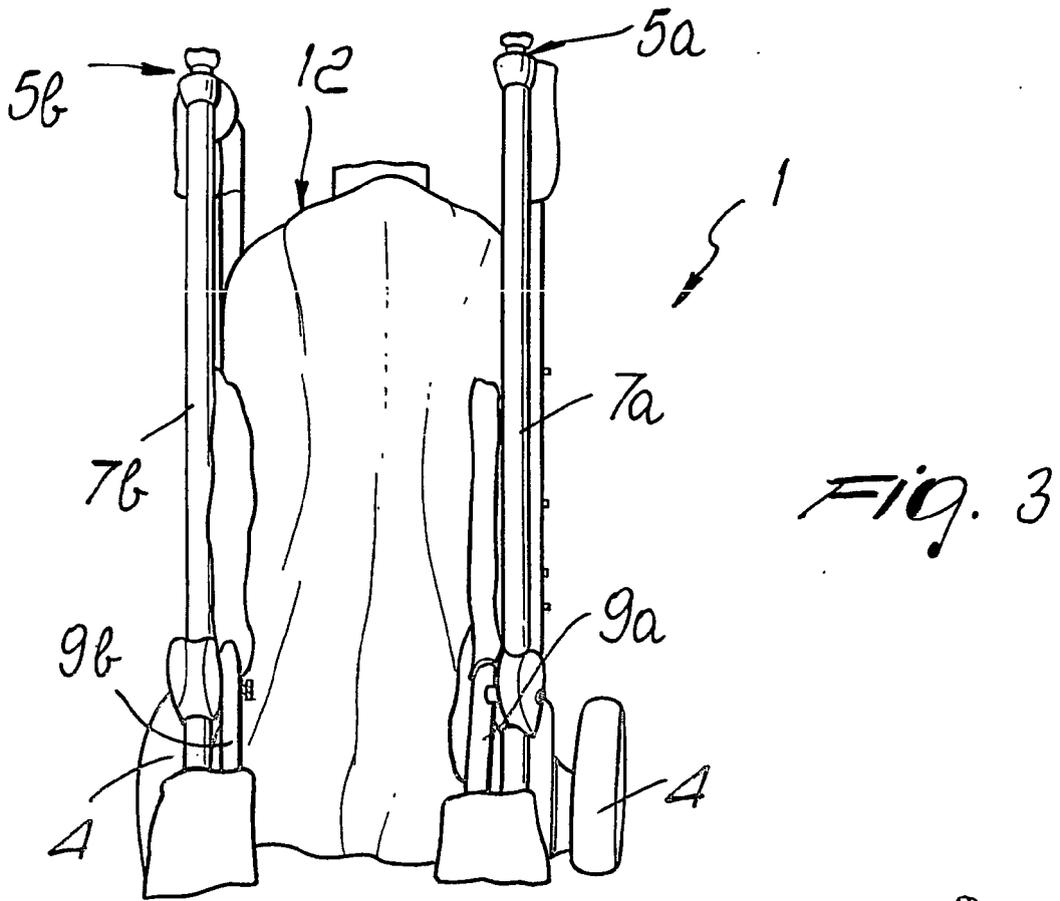


Fig. 2



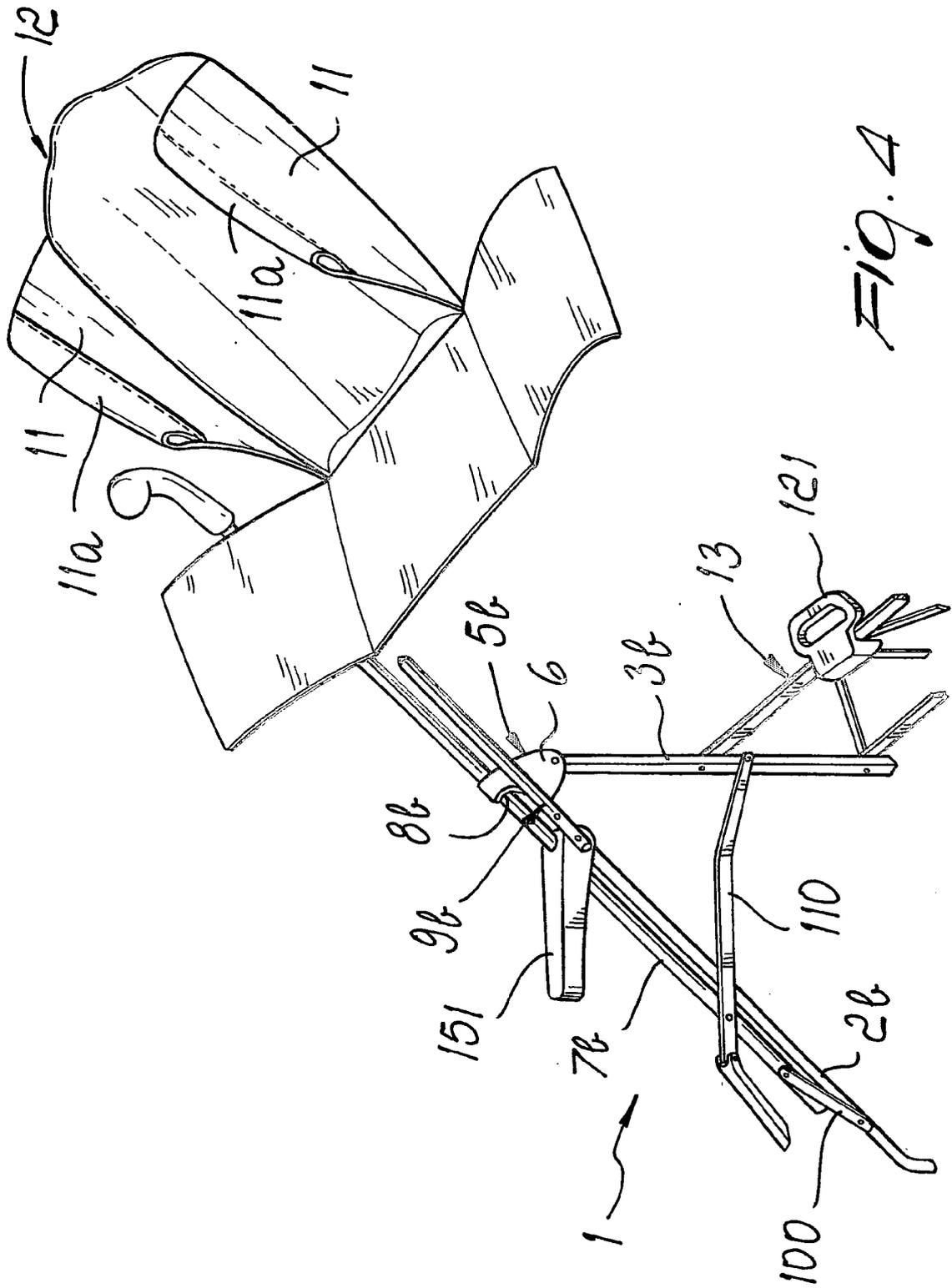


FIG. 4

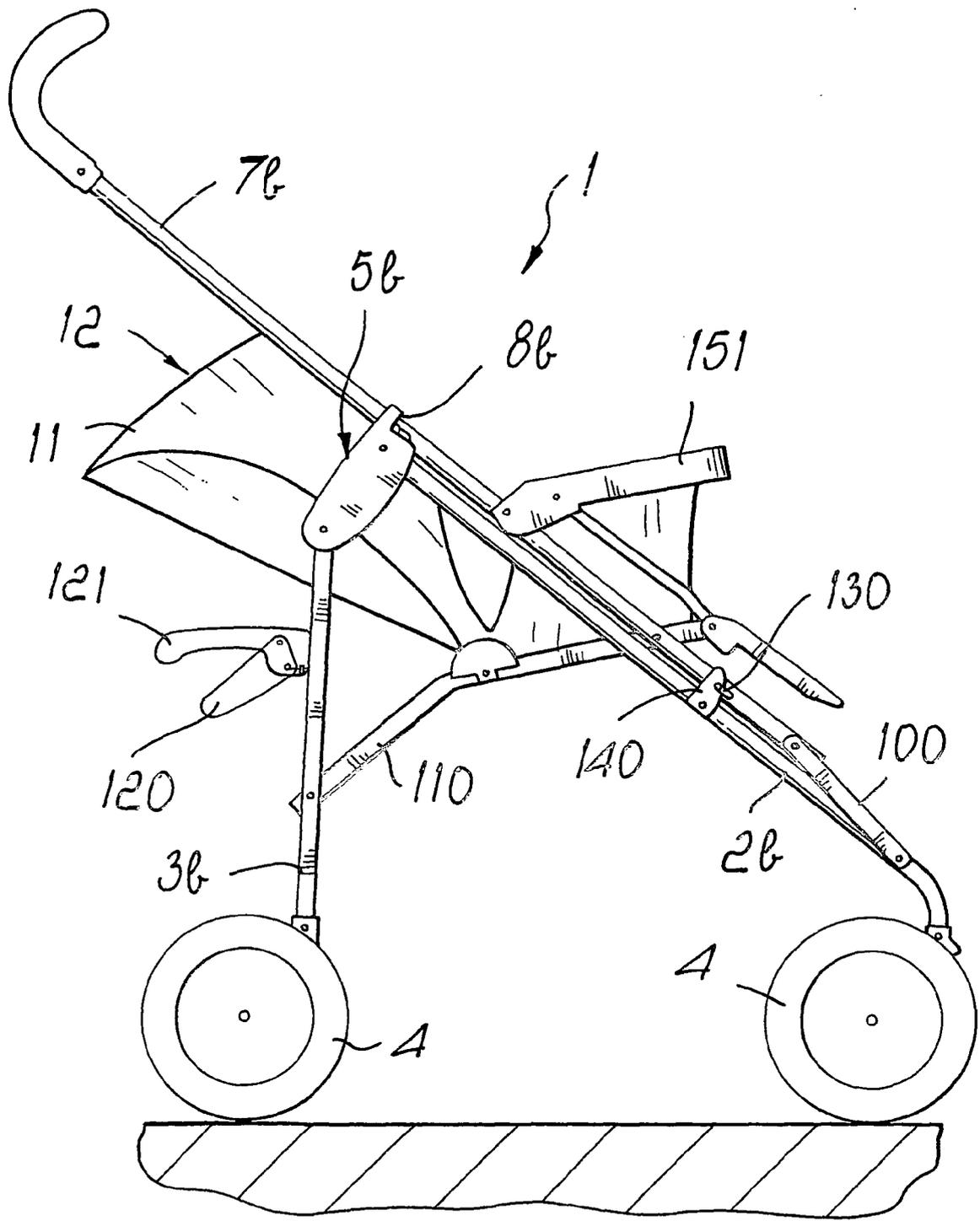


Fig. 6

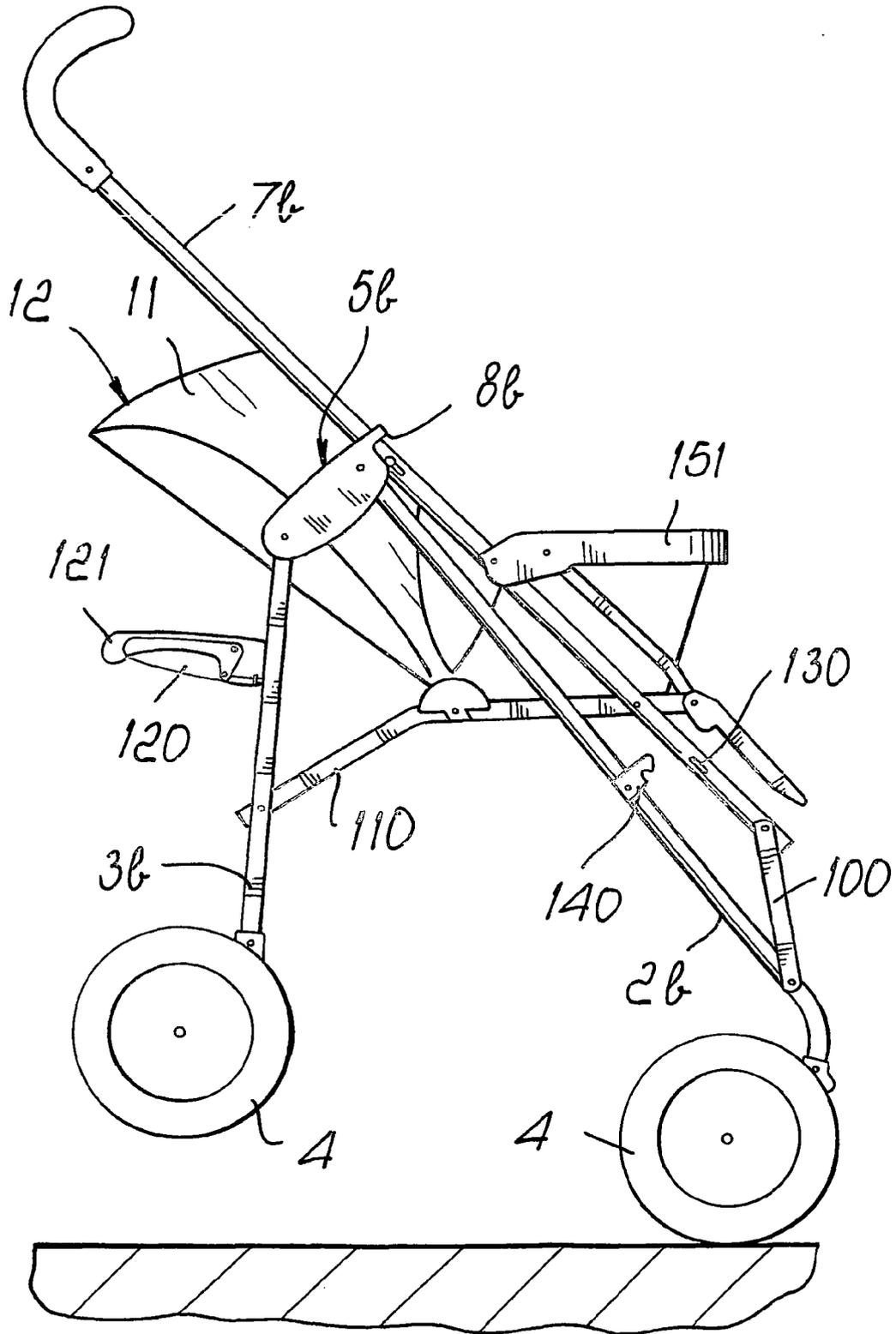


FIG. 7

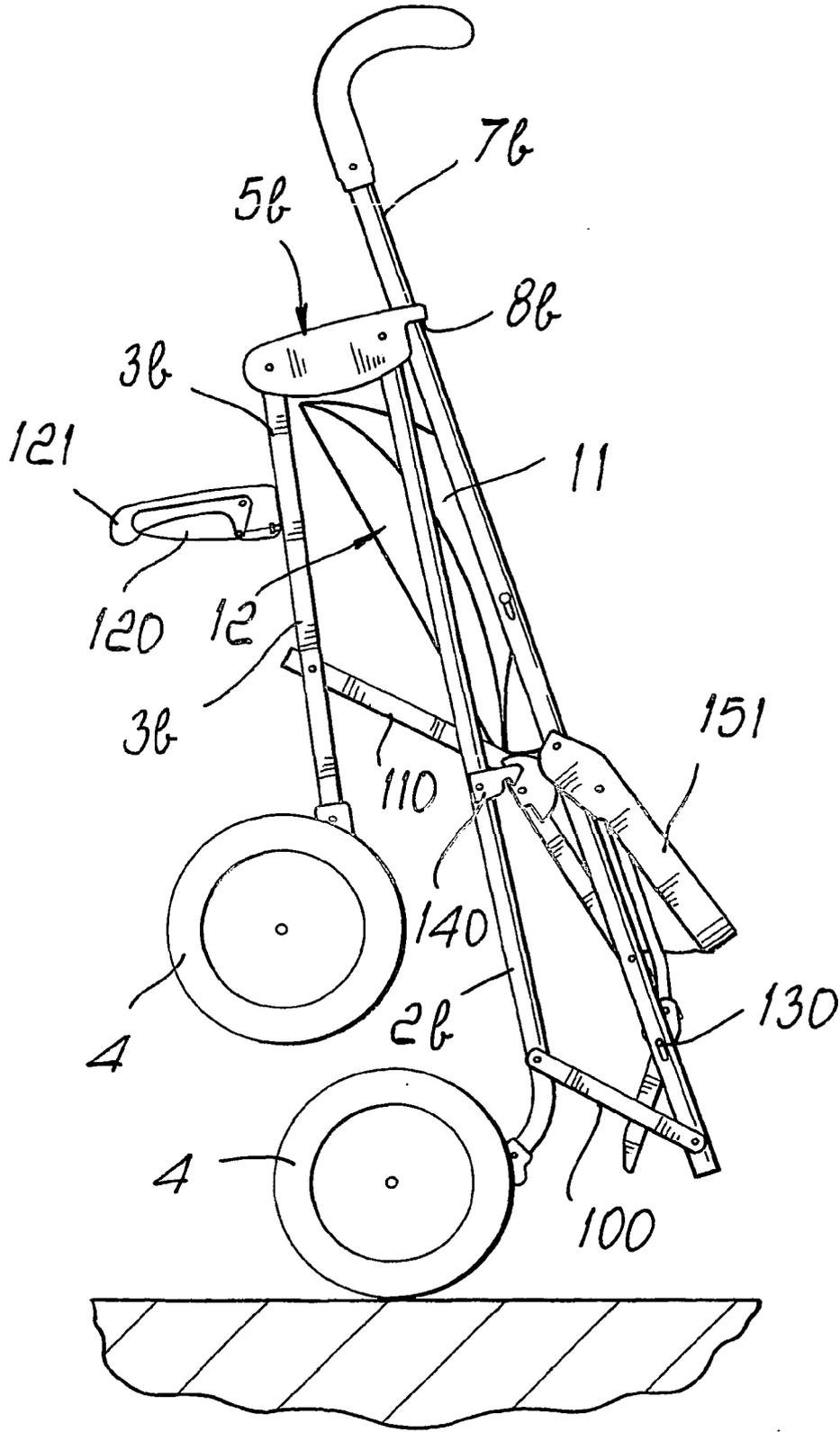


Fig. 8

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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