

RESERVE COPY

35

PATENT SPECIFICATION

DRAWINGS ATTACHED

L154362



Date of filing Complete Specification (under Section 3 (3) of the Patents Act 1949) 19 July, 1966.

Application Date: 20 July, 1965.

Application Date: 10 Aug., 1965.

Complete Specification Published: 4 June, 1969.

© Crown Copyright 1969.

L154,362

No. 30787/65.

No. 34181/65.

Index at acceptance: —B7 B 14; A4 J(1A5, 1B, 2E)

Int. Cl.: B 62 b 3/02, A 47 c 4/28

COMPLETE SPECIFICATION

Improvements relating to Structures for Folding Baby-Carriages, Chairs, and the like

I, OWEN FINLAY MACLAREN, a British Subject of Arnold House, Barby, near Rugby, Warwickshire, do hereby declare the invention for which I pray that a Patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to structures for folding baby-carriages, folding chairs, invalid chairs, or analogous structures in which similar requirements arise, hereinafter called folding structures. There are many previous folding structures, and most of them fold "flat"; that is to say their extended and basically 3-dimensional envelope, is foldable into a basically 2-dimensional envelope, disregarding the obviously necessary structural volume when folded. The present invention is concerned with structures which may be colloquially described as "stick folding" as compared to "flat folding". That is to say that when folded they occupy a relatively very small cross-sectional bundled-up area roughly corresponding to a stick-like formation in the sense that a folded umbrella is a stick-like formation. The cross-sectional area of the envelope of the structure when folded, is not much larger than that of the sum of the cross-sectional areas of the component members in their most compact relationship, and occupies the minimum transverse dimensions: in the present invention this is achieved without recourse to any telescopically operating members.

The invention is primarily directed to the structure of a baby-carriage which is "stick folding" and which when folded, can indeed be handled, stowed, or packed, somewhat in the manner of a walking stick or shooting stick and is of light enough construction to make this feasible. The invention may, however, be applied, as a structure, to a folding

chair, an invalid chair, a shopping-carrier, or any analogous article, wherein a three-dimensional structure is required to be folded into a stick-like formation, and especially when the intended structure must be strong and capable of adapting itself to uneven standing, trundling on wheels, and yet light and economic to make.

According to the invention, a folding structure for the purpose indicated comprises when extended two X-like frames each comprising two intersecting inter-pivoted rigid elements, which frames are articulatedly interconnected at two pairs of corresponding corners thereof so that when extended these frames lie substantially in planes at an angle one to the other and when collapsed their elements lie near-parallel, two brace elements each connected to a free corner of each frame to complete a triangular formation as seen in side elevation when extended of which two sides lie respectively one in the plane of each of the frames, and the third side corresponds to the brace elements, and collapsible toggle-bar means connected articulatedly to the two frames and such that when extended such toggle-bar means keeps the frames extended.

In practice the brace elements should be such that they resist lengthwise compression, for example by pivotally crossing a dead centre.

According to the invention somewhat more specifically, the structure comprises when extended, a bottom X-like frame in an approximately horizontal plane, of two inter-pivoted members; a back X-like frame, in an upright plane and also of two inter-pivoted members, the two adjacent pairs of corners of these frames being pivotally interconnected; and two brace elements connected to the other pairs of corners of the two X-frames so as to form a triangular shape in side elevation, the brace

[Price 4s. 6d.]

Price 4s. 6d.

elements being foldable; and toggle strut means to interconnect the members of one X-frame transversely and hold both X-frames in the extended condition.

- 5 Such a structure is collapsible into a situation wherein all the members and elements lie nearly parallel, thus forming in what has been termed a stick-like folded condition, by reason of the two X-like frames collapsing each controlled by the other, and by the holding of the brace elements so that the outer ends of the X-frames come together.

- 10 Further, means in the form of a dead-centre toggle link are preferably provided, folding together with the foregoing, and such that when extended the link in compression locks the structure extended.

The brace members are preferably extended to form handles.

- 20 Wheels may be provided—and of course for a baby or invalid carriage are provided; these, in the form of sets of single or twin wheels, are located near each corner of the bottom X-frame and such may be borne at the lower ends of the brace elements and the other

- 25 pair on the lower ends of the back X-frame. Also included in the invention is a structure in which one pair of wheel sets is borne at the lower ends of struts attached at their upper ends to the brace elements and at points of the structure in the vicinity of the pivotal interconnections of the two X-like frames.

- 30 In the case of a carriage or a chair, there is provided a pliable fabric seat, and this is basically a length of fabric attached to the brace elements and folding as they fold. The brace elements also afford lateral support for the occupant and may be protected or up-holstered. A foot rest preferably takes the

- 40 form of a strip of pliable fabric, or a strap extending between the bottom ends of the brace elements or the forward corners of the bottom X-frame; acting as a tension member it may serve to brace the front end of the structure against any tendency to splay.

- 45 The structure is preferably held extended by a toggle element which comprises two bars centrally interpivoted with a "dead centre" stop, and pivoted at each end near the bottom corners of the back X-frame; in that situation it is conveniently operable by one foot. However, such a toggle element may be near the upper end of the structure—for example

- 55 X-frame, in which case it is conveniently hand-operated.
- 60 Whilst the structure as a whole can easily be carried like a shooting-stick, one pair of wheels remain operable at the bottom end when folded and so the folded structure may be trundled on those wheels. It then becomes practicable to hand onto it in some convenient manner a shopping bag or basket, the greater part of the weight being wheel-

borne, when the apparatus is not in use as a carriage.

Two forms of baby-carriage will now be described, as examples of the invention. They are illustrated by the accompanying drawings in which:—

Figure 1 is a perspective view of one form of the structure extended;

Figure 2 is a side-elevation illustrating the geometry of the structure extended, and in dotted line, partially folded;

Figure 3 is an elevation of the structure in its folded state, and represents what is herein called "stick folding"; and

Figure 4 is a perspective view of a second form of the structure extended.

The bottom X-frame is two tubes 1, 2, pivoted at their intersection at 3. The tubes 1, 2, can be considered to be diagonals of a rectangle of which the four corners are the effective ends of the tubes. The so-called front corners are at 1A, 2A and rear corners at 1B, 2B. The back X-frame is two tubes 4, 5, pivoted at their intersection at 6. Its upper corners are at 4A, 5A and bottom corners at 4B, 5B. As seen in Figure 2, the tubes 1 and 2 form an X-frame, and nearly lie in one plane when the structure is extended and this plane is substantially horizontal. They are slightly bowed so that the corners lie in one plane. The tubes 4 and 5, likewise as an X-frame, occupy an upright plane which is inclined by a fairly small angle, from the vertical, and constitute the back frame. In the vicinity of the corners 4B, 5B, the ends of parts 1, 2, 4 and 5 are conjoined articulately, and it is convenient to think of the two X-frames as a "lazy tongs" linkage in two planes. It follows that if either X-frame is collapsed about its intersection 3 or 6, the other must likewise collapse. When collapsed since both frames collapse together, the four tubes can be arranged to come mutually near-parallel (see Figure 3) and this is fairly representative of what is called "stick folding".

From near the corners 1A, 2A respectively to the corners 5A, 4A, and extended upwards (as at 7A, 8A) there are brace elements. These comprise a tube 7, 8, respectively which is knuckle-jointed at 7B, 8B, and articulated near the corners at 4A and 5A to the back X-frame. The lower extent of these brace elements, are lengths of tube 7C, 8C. The knuckle joints between 7, 8 and 7C, 8C are such that when the structure is extended these tubes 7C, 8C respectively are aligned with tubes 7, 8, or just over a dead-centre, and are positively stopped in that condition: in that condition the braces are therefore capable of acting as compression members. It will thus be seen that as viewed in side elevation the figure formed by the two X-frames (or rather the planes in which they respectively lie) and the brace elements, is triangular.

At the upper extremities 7A, 8A, the tubes are bent and having appropriate grips, form handles 7D, 8D. These may be of D-section as shown, so that they can nest together and form an easily handled single grip when the structure is folded as in Figure 3.

Between the corners at 4B, 5B, and pivoted in the regions thereof, there is a toggle bar or strut; this is two rigid parts such as tubes or bars, namely 9A, 9B, and a knuckle joint 10 which, like the braces, is arranged to lock at or just over a dead-centre. The toggle bar obviously controls the lateral dimension of the structure when extended. It will be noted that it acts as a strut between corners 4B, 5B and it can easily be operated (for erection) by the foot of the user bearing down, or released by the foot hooking it upwards.

In this example, the child's seat consists of an area of pliable fabric 11 such as woven plastics. It is hung at its upper edge 11A, on a cord or cable attached to tubes 7, 8, preferably in a marked catenary curve to minimise tension. A safety strap 11C is provided. At its lower (front) corners, the seat 11 is attached to the front ends of two bars 12A, 12B which are pivoted at or near the corners 2B, 1B and pivoted to the brace tubes 7C, 8C. The seat fabric may also be attached to 12A, 12B along about half their lengths, whereby a bucket-like seat is formed.

A foot-rest is shown at 11B. This is a band or strap, again preferably of woven plastics, and it is attached to the parts 1, 2 near and forward of the corners 1A, 2A, and it can not only act as a foot rest but as a tension member to resist splaying apart of the corners 1A, 2A.

The bottom ends of tubes 7C, 8C, extend somewhat below the corners 1A, 2A, and on stub-axes, bear front wheels 13, 14. Extensions of tubes 4, 5, likewise bear rear wheels 16, 15. The pair of wheels 13, 14 are so spaced that when the structure is folded (Figure 3) the wheels come just outside the folded structure; and in the folded condition it will be noted that the wheels 15, 16, now canted (see Figure 3) are still able to be used if the folded structure is to be trundled on the ground.

In addition to the seat part 11, a shopping bag or basket may easily be hung from the parts 7A, 8A for use either when the structure is extended or collapsed, so the carriage can conveniently be used simply as a shopping-carrier in its folded form, or have a shopping-bag as an accessory when a child is being trundled.

To fold the structure from the condition of Figure 1 to that of Figure 3 (as is seen by the dotted lines in Figure 2) the user "breaks" the toggle 9A, 9B, upwards and urges the handles 7D, 8D together. This collapses the X-frames and this action is accompanied by "breaking" of the braces (about

pivots 7B, 8B) so that corners 1A, 2A, rise towards the upward, folded, position.

Continued foldings, beyond the condition dotted in Figure 2, although possible in theory by continuing to bring the handles 7D, 8D together, is in fact not practicable, so the user assists folding by directly raising the forward end of the structure (or pressing down the handles towards the ground) until the folded condition of Figure 3 is reached.

Spring stirrup-clips (not shown) may be provided, at locations such as 17, to hold the structure together when folded, these clipping on to 7 and 8.

Referring now to Figure 4, reference numerals corresponding to those in Figure 1 are used where applicable and corresponding parts of the description are not repeated.

Twinned sets of double wheels generally indicated at 20, 21, 23 and 24 are used instead of the single wheels used in the first embodiment. The front wheel sets 20 and 21 are mounted as before on the lower tubes 7C, 8C of the brace elements but the rear double wheel sets 23 and 24 are mounted not on the back X-frame tubes 5 and 4 but are mounted on separate wheel-carrying struts 41 and 40 pivotally connected to the brace elements a short distance above the knuckle joints 7B, 8B. The strut tubes 41 and 40 are also connected pivotally in the vicinity of the corners 4B and 5B to the two X-frames. The bars 12A, 12B in the case of Figure 4 act as ties for the tube lengths 7C and 8C when extended; they serve for seat attachment as in Figure 1; and it is to be noted that their length between pivots is somewhat critical, as only in one somewhat precise position of the pivots (having regard to such length) will they, like the upper portions of the struts 40, 41 which constitute back legs, serve to afford the simultaneous folding of the mechanism in both planes throughout its range.

Each wheel set is provided with a rubber suspension. To this end the wheel sets are mounted on plates 42 pivoted at 43 to the appropriate wheel carrying tubes 7C, 8C, 40 and 41 the plates of each set of wheels being joined so as to pivot together as a single unit. A rubber block 44 is attached between each of the pairs of plates 42 and when the structure is loaded, the block 44 will bear resiliently against its wheel-carrying tube thus providing a springy suspension.

A brake is provided for one rear wheel set and comprises a bar 46 hinged to the tube 40 and connected to a pair of rubber brake pads 47 by a cam arrangement indicated at 48. Downward movement of a rubber knob 49 on the bar 46 applies the pads 47 to the wheels 24, the pads 47 being spring urged away from the wheels 24 by a spring 35.

Also provided is a clip arrangement con-

sisting of a clip 50 and stud 51 for retaining the structure in its folded position.

5 It will be understood that the modifications shown in Figure 4 will provide a more sturdy structure capable of carrying a greater load, the double wheels giving greater stability and the rubber suspension providing a smoother ride.

10 In a further modification of the invention (not shown) which may be applied to either of the previously described forms of structure, the toggle bar comprised by the parts 9A, 9B is moved from its position interattaching the corners 4B, 5B of the rear X-frame to a position interattaching the regions of the corners 4A and 5A, where it is more accessible for hand operation.

WHAT I CLAIM IS:—

20 1. A folding structure comprising when extended two X-like frames each comprising two intersecting inter pivoted rigid elements, which frames are articulately interconnected at two pairs of corresponding corners thereof so that when extended these frames lie substantially in planes at an angle one to the other and when collapsed their elements lie near-parallel, two brace elements each connected to a free corner of each frame to complete a triangular formation as seen in side elevation when extended of which two sides lie respectively one in the plane of each of the frames, and the third side corresponds to the brace elements, and collapsible toggle-bar means connected articulately to the two frames and such that when extended such toggle-bar means keeps the frames extended.

40 2. A folding structure comprising, when extended, a bottom X-like frame, in an approximately horizontal plane, of two inter pivoted members; a back X-like frame, in an upright plane and also of two inter pivoted members, the two pairs of adjacent corners of these frames being pivotally interconnected; and two brace elements connected to the other pairs of corners of the two X-frames so as to form a triangular shape in side elevation, the brace elements being foldable; and toggle strut means to interconnect the members of one X-frame transversely and hold both X-frames in the extended condition.

50 3. A structure as claimed in claim 2,

wherein four wheel sets are provided, one near each corner of the bottom X-like frame.

4. A structure as claimed in claim 3, wherein two of the wheel sets are mounted on ends of the brace elements extending below the bottom X-frame. 55

5. A structure as claimed in claim 3 or claim 4, wherein each wheel set is a single wheel. 60

6. A structure as claimed in claim 3 or claim 4, wherein each wheel set is formed of twin wheels mounted for coaxial rotation.

7. A structure as claimed in any of claims 3 to 6, wherein the wheels are provided with a resilient rubber block suspension. 65

8. A structure as claimed in any of claims 3 to 7, wherein two of the wheel sets are mounted on extensions of two strut members which connect an intermediate portion of the two brace elements to the structure in the vicinity of the bottom corners of the pivotal interconnections of the adjacent corners of the X-like frames. 70

9. A structure as claimed in any of claims 2 to 8, wherein a pliable fabric seat is provided comprising a length of fabric attached to the brace elements. 75

10. A structure as claimed in any of claims 2 to 8, wherein the toggle strut means when unfolded extends from between the vicinity of the pivotal interconnections of the adjacent corners of the X-like frames. 80

11. A structure as claimed in any of claims 2 to 8, wherein the toggle strut means interconnects the arms of the back X-frame at the top thereof. 85

12. A structure as claimed in any preceding claim, wherein the brace elements have handles at one end. 90

13. A folding structure substantially as described with reference to Figures 1 to 3 of the accompanying drawings.

14. A folding structure substantially as described with reference to Figure 4 of the accompanying drawings. 95

CLEVELAND AND JOHNSON,
Chartered Patent Agents,
Agents for the Applicant,
Chancery House, Chancery Lane,
London W.C.2.

sisting of a clip 50 and stud 51 for retaining the structure in its folded position.

5 It will be understood that the modifications shown in Figure 4 will provide a more sturdy structure capable of carrying a greater load, the double wheels giving greater stability and the rubber suspension providing a smoother ride.

10 In a further modification of the invention (not shown) which may be applied to either of the previously described forms of structure, the toggle bar comprised by the parts 9A, 9B is moved from its position interattaching the corners 4B, 5B of the rear X-frame to a position interattaching the regions of the corners 4A and 5A, where it is more accessible for hand operation.

WHAT I CLAIM IS:—

20 1. A folding structure comprising when extended two X-like frames each comprising two intersecting interpivoted rigid elements, which frames are articulately interconnected at two pairs of corresponding corners thereof so that when extended these frames lie substantially in planes at an angle one to the other and when collapsed their elements lie near-parallel, two brace elements each connected to a free corner of each frame to complete a triangular formation as seen in side elevation when extended of which two sides lie respectively one in the plane of each of the frames, and the third side corresponds to the brace elements, and collapsible toggle-bar means connected articulately to the two frames and such that when extended such toggle-bar means keeps the frames extended.

40 2. A folding structure comprising, when extended, a bottom X-like frame, in an approximately horizontal plane, of two interpivoted members; a back X-like frame, in an upright plane and also of two interpivoted members, the two pairs of adjacent corners of these frames being pivotally interconnected; and two brace elements connected to the other pairs of corners of the two X-frames so as to form a triangular shape in side elevation, the brace elements being foldable; and toggle strut means to interconnect the members of one X-frame transversely and hold both X-frames in the extended condition.

50 3. A structure as claimed in claim 2,

wherein four wheel sets are provided, one near each corner of the bottom X-like frame.

4. A structure as claimed in claim 3, wherein two of the wheel sets are mounted on ends of the brace elements extending below the bottom X-frame. 55

5. A structure as claimed in claim 3 or claim 4, wherein each wheel set is a single wheel. 60

6. A structure as claimed in claim 3 or claim 4, wherein each wheel set is formed of twin wheels mounted for coaxial rotation.

7. A structure as claimed in any of claims 3 to 6, wherein the wheels are provided with a resilient rubber block suspension. 65

8. A structure as claimed in any of claims 3 to 7, wherein two of the wheel sets are mounted on extensions of two strut members which connect an intermediate portion of the two brace elements to the structure in the vicinity of the bottom corners of the pivotal interconnections of the adjacent corners of the X-like frames. 70

9. A structure as claimed in any of claims 2 to 8, wherein a pliable fabric seat is provided comprising a length of fabric attached to the brace elements. 75

10. A structure as claimed in any of claims 2 to 8, wherein the toggle strut means when unfolded extends from between the vicinity of the pivotal interconnections of the adjacent corners of the X-like frames. 80

11. A structure as claimed in any of claims 2 to 8, wherein the toggle strut means interconnects the arms of the back X-frame at the top thereof. 85

12. A structure as claimed in any preceding claim, wherein the brace elements have handles at one end. 90

13. A folding structure substantially as described with reference to Figures 1 to 3 of the accompanying drawings.

14. A folding structure substantially as described with reference to Figure 4 of the accompanying drawings. 95

CLEVELAND AND JOHNSON,
Chartered Patent Agents,
Agents for the Applicant,
Chancery House, Chancery Lane,
London W.C.2.

