United States Patent [19]

Firth et al.

[11] **3,918,734**

[45] **Nov. 11, 1975**

[54] **COLLAPSIBLE STRUCTURE**

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[73] Assignee: **Lawrence Wilson & Son Limited,** Yorkshire, England

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[30] **Foreign Application Priority Data**

Dec. 18, 1973 United Kingdom 326/73

[52] **U.S. Cl.** ..... **280/36 B**

[51] **Int. Cl.**[2] **B62B 7/08**

[58] **Field of Search** ... 280/36 B, 41 A, 41 B, 47.38; 188/4 R, 20, 110, 143

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Primary Examiner—Drayton E. Hoffman
Assistant Examiner—Norman L. Stack, Jr.
Attorney, Agent, or Firm—Wolf, Greenfield & Sacks

[57] **ABSTRACT**

A collapsible structure comprising a bottom X-like frame composed of two interpivotted rigid members, and a pair of side X-like frames each composed of two interpivotted rigid elements and each pivotally connected to the bottom X-like frame, the members of each side frame being interconnected for relative movement about two axes of rotation, a foldable handle connected to the interpivotting point of the members of said bottom X-like frame, and means to maintain the structure in an erected position in which the side X-like frames are located in generally vertical planes, release of said means and movement of said handle towards said bottom X-like frame causing relative movement between the members of the bottom X-like frame and between the members of the side X-like frames, and movement of the side frames towards one another, so that said members lie in juxtaposed positions in generally parallel planes. In its application to a baby carriage the structure will carry a collapsible seating unit and wheels and brake/stabiliser assemblies.

3 Claims, 11 Drawing Figures

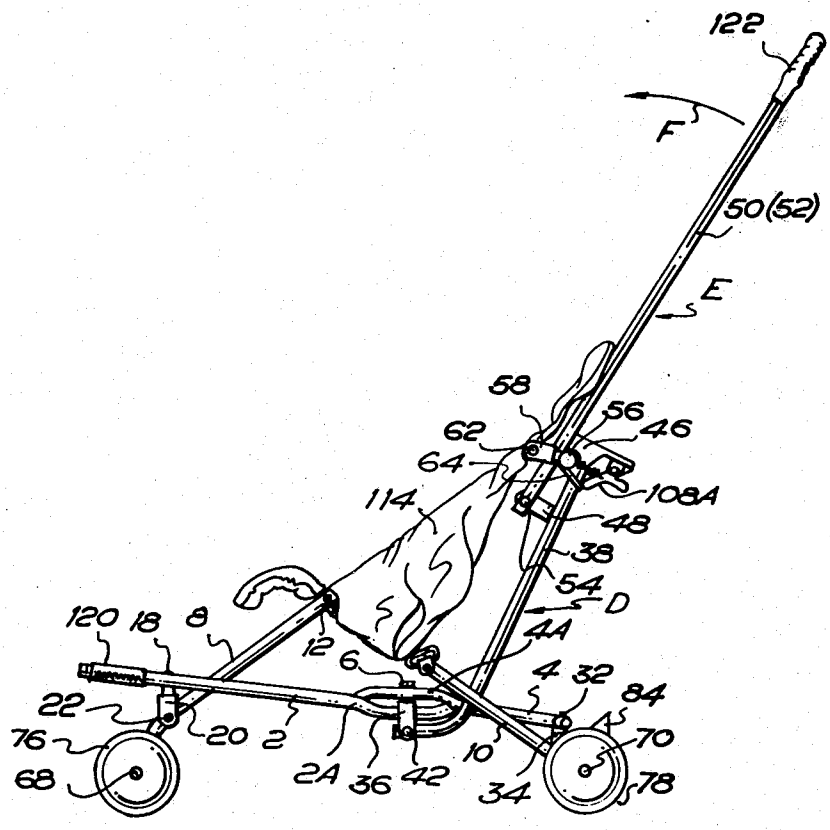
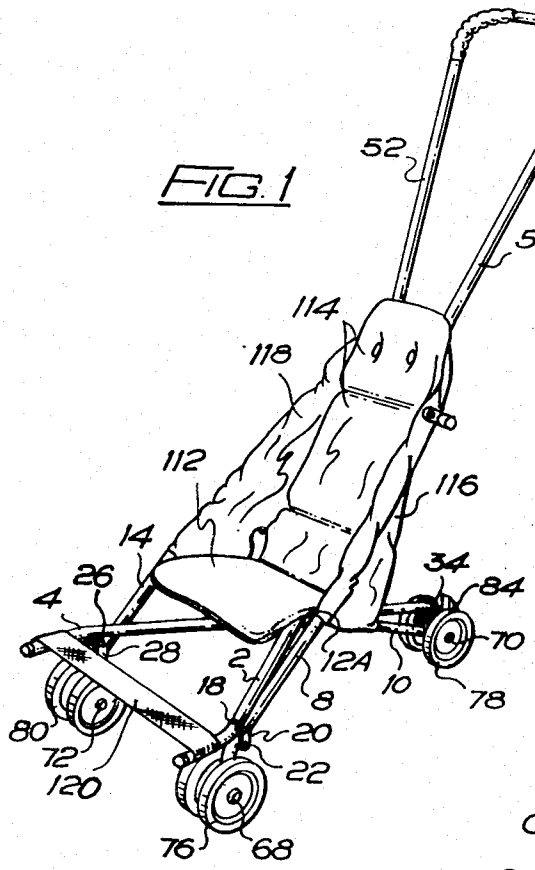


FIG. 1



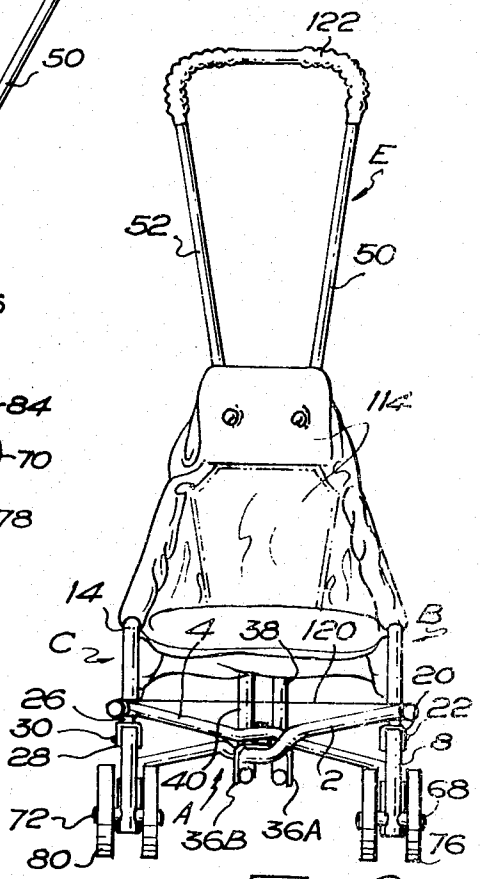


FIG. 2

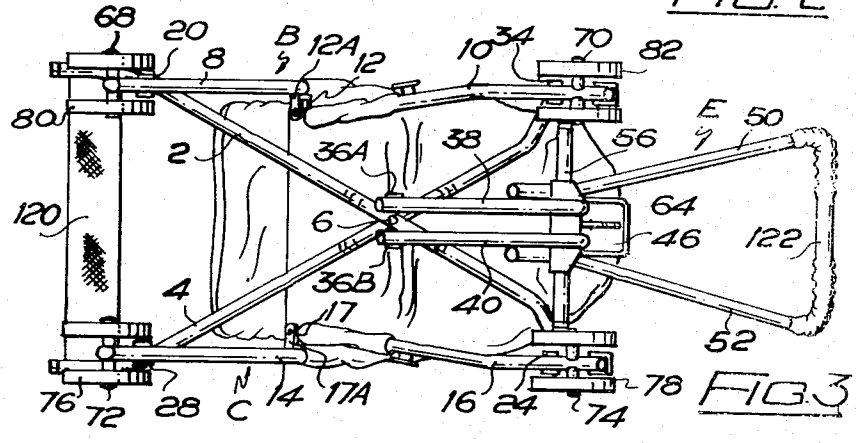


FIG. 3

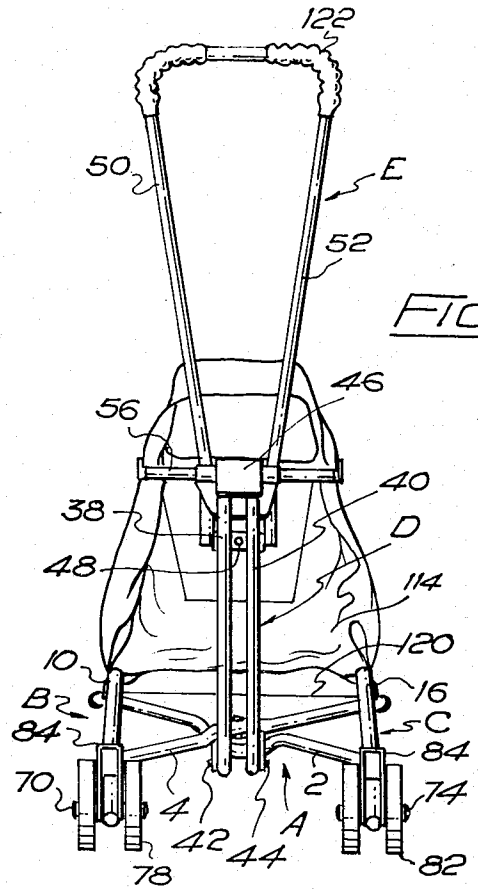

122
50
E
52
46
56
40
38
D
48
114
120
10
16
B
C
84
84
70
74
4
2
42
A
44
78
82

FIG. 5

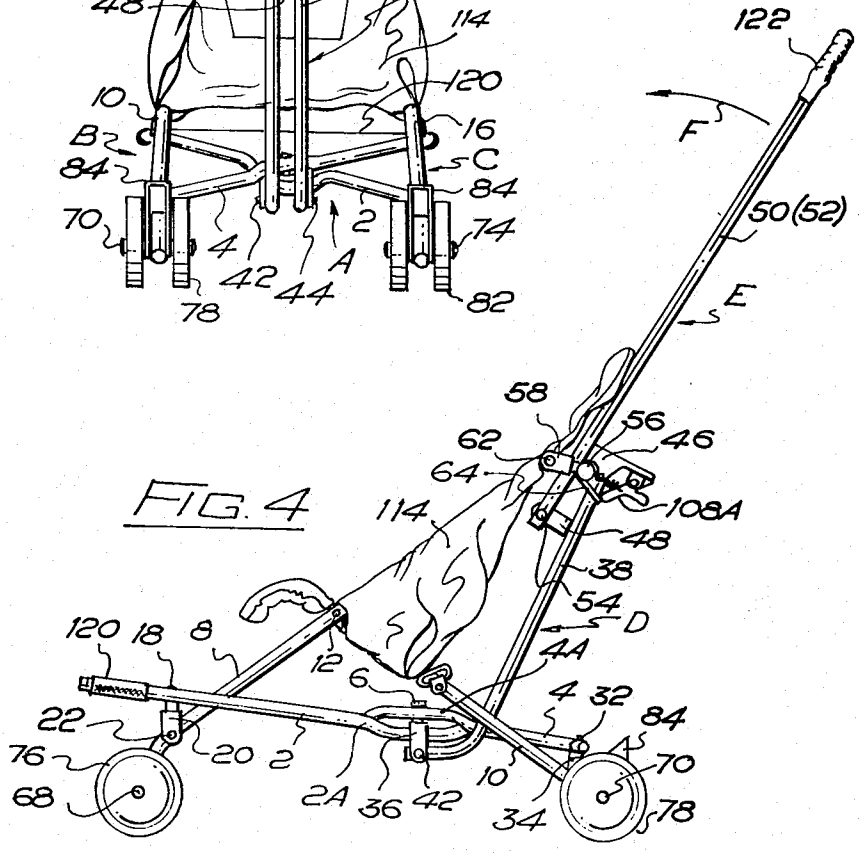

122
F
50(52)
E
58
56
46
62
64
108A
114
48
38
54
D
44
120
18
8
12
6
4
32
84
22
20
2
10
70
76
68
2A
36
42
34
78

FIG. 4

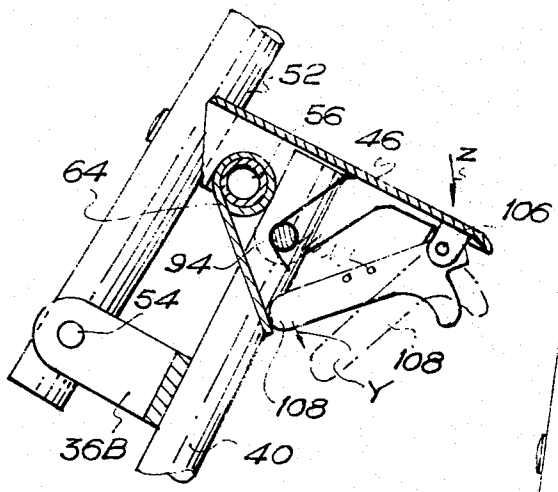


FIG. 6

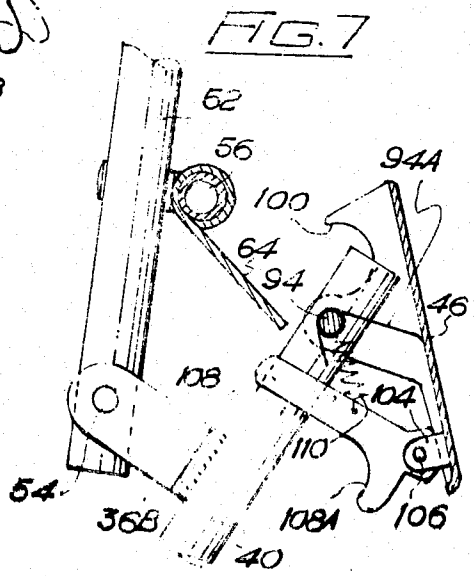


FIG. 7

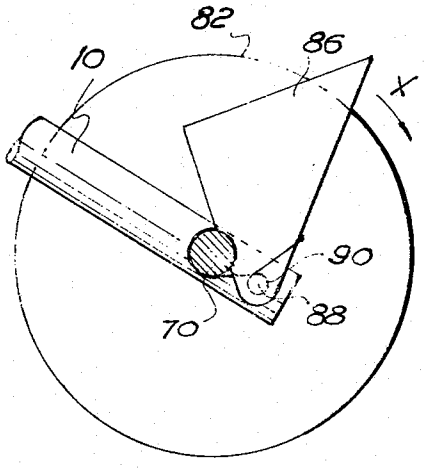


FIG. 8

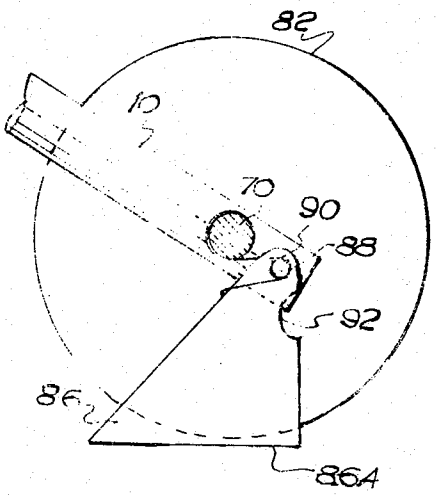


FIG 9

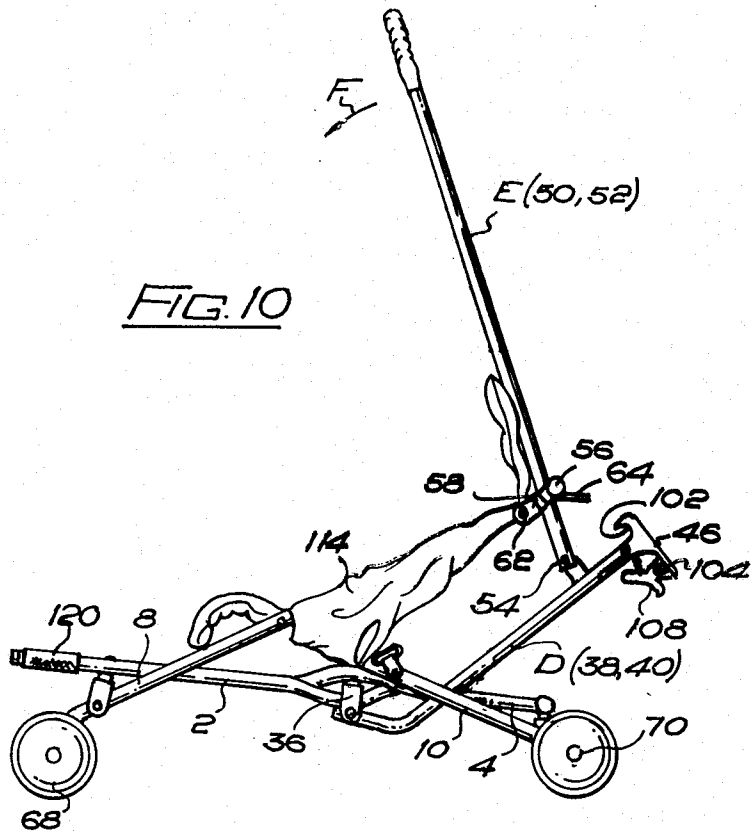

F
E(50,52)
56
64
58
102
46
114
62
104
54
108
120
8
D(38,40)
2
36
10
4
70
68

FIG. 10

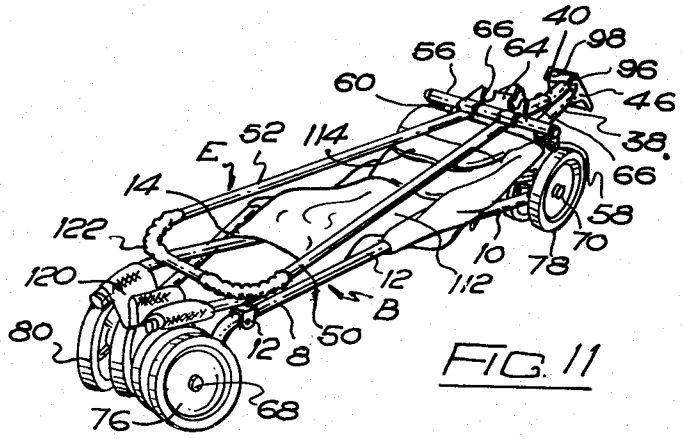

40
66
64
98
56
96
60
46
52
114
38
E
66
14
58
122
70
10
78
120
12
112
B
80
12
8
50
76
68

FIG. 11

COLLAPSIBLE STRUCTURE

This invention relates to collapsible structures, particularly, but not exclusively for baby carriages, invalid chairs and like conveyances.

Collapsible structures for the above purposes are well known, one particular form of structure comprising a bottom X-like frame and a back X-like frame in an inclined plane which are pivotally connected together, the structure including associated members, and the whole is collapsible from an erected condition into what is termed a "stick-like formation". This known form of structure includes a two part toggle bar or strut, the two parts lying in parallel relationship when the structure is in an erected condition. These two parts are moved relative to one another about a generally central pivot point to obtain collapse of the structure, the two parts being intended to be foot operated.

In its application to a baby carriage, the structure is intended to carry a seating unit, but because the structure collapses to a stick-like formation, such a seat structure can only be formed of a pliable fabric so that the seat structure can fold into the stick-like formation. It is thought that such a seat structure is inadequate and does not provide proper support for the baby or infant using the chair, and the present invention seeks to provide an improved form of collapsible structure for use in for example push chairs a baby carriages, which structure because of the manner of collapsing will enable at least a semi-rigid seating unit to be carried by the structure.

Accordingly, the present invention provides a collapsible structure comprising a bottom X-like frame composed of two interpivoted rigid members, and a pair of side X-like frames each composed of two interpivoted rigid elements and each pivotally connected to the bottom X-like frame, the members of each side frame being interconnected for relative movement about two axes of rotation, a foldable handle connected to the interpivoting point of the members of said bottom X-like frame, and means to maintain the structure in an erected position in which the side X-like frames are located in generally vertical planes, release of said means and movement of said handle towards said bottom X-like frame causing relative movement between the members of the bottom X-like frame and between the members of the side X-like frames, and movement of the side frames towards one another, so that said members lie in juxtaposed positions in generally parallel planes.

Preferably, the members of the bottom X-like frames are connected to the members of the side X-like frames for movement about two axes of rotation so as to enable the juxtapositioning when the structure is collapsed.

The handle will include a handle support to which the handle is pivotally connected, the handle support being connected to the interpivoting point of the members of the bottom X-like frame.

The members of the bottom X-like frame will preferably be cranked in their interpivoting positions so that the members lie in the same general plane, and the said members will be pivotally connected to the members of the side X-like frames by means of U-shaped brackets and pivot pins, the U-shaped brackets embracing the members of the side X-like frames.

The means to maintain the structure in an erected position will preferably be carried by the handle support and will comprise pivotable latch means adapted to engage a latch bar carried by the side X-like frames, the latch means preferably including a pivotable safety catch.

The collapsible structure will carry front and rear pairs of double-wheel assemblies, the wheels of each assembly being mounted on a common axle or spindle, each rear wheel assembly carrying a combined stabiliser/brake assembly whicn in an operative position is adapted to raise the rear wheel assemblies clear of a support surface. Each stabiliser/brake assembly will preferably be spring biassed to an inoperative position.

The collapsible structure will, in its application to a baby carriage, carry a foldable seating unit including an integral head rest portion.

In order that the invention may be more readily understood, an embodiment thereof will now be described, by way of example, reference being made to the accompanying drawings which illustrate the invention as used in a baby cariage.

IN THE DRAWINGS

FIG. **1** is a front perspective view of a baby carriage incorporating a collapsible structure according to the invention and showing the structure in an erected conditions;

FIG. **2** is a front elevation of the baby carriage of FIG. **1**;

FIG. **3** is an underneath plan view of the baby carriage;

FIG. **4** is a side elevation of the baby carriage;

FIG. **5** is a rear elevation of the baby carriage;

FIGS. **6** and **7** are enlarged detailed sectional views of part of the structure of FIGS. **1** to **5** and showing the part in differing positions;

FIGS. **8** and **9** are enlarged detailed sectional views of a further part of the structure FIGS. **1** to **5** and showing the part in differing positions;

FIG. **10** is a side elevation of the baby carriage and showing the structure in a partially collapsed condition; and

FIG. **1** is a top perspective view showing the baby carriage structure in a fully collapsed condition.

Referring to the drawings, and firstly to FIGS. **1** to **5**, the baby carriage illustrated comprises a collapsible structure and a seat portion or unit. The collapsible structure includes a bottom X-like frame A, spaced-apart X-like side frames B and C, a handle supporting member D and a handle E.

The bottom X-like frame A, when the structure is in an erect position as shown in FIGS. **1** to **5**, is generally horizontal and comprises first and second interpivoted lightweight tubular members **2** and **4** which are pivotted together by means of a pivot pin **6** so that the members may move relative to one another in substantially the same plane, this being achieved by cranking the members **2** and **4** as indicatd at **2A** and **4A**.

The side X-like frame B comprises lightweight tubular members **8** and **10** interpivotted by means of a pivot pin **12** and bracket **12A** and the side X-like frame C comprises lightweight tubular members **14** and **16** interpivotted by means of a pivot pin **17** and bracket **17A**, the brackets **12A** and **17A** embracing their respective members as shown.

The member **2** is pivotally connected to the member **8** of the side frame B and also the member **16** of the

side frame C as follows. A pivot pin **18** secured to a U shaped bracket **20**, which embraces the member **8** and which is movably secured thereto by pivot pin **22** connects the member **2** to the member **8**, and a pivot pin (not shown) secured to a U-shaped bracket **24**, which embraces the member **16** and which is movably secured thereto by a pivot pin (not shown), connects the member **2** to the member **16**.

Similarly, the member **4** is pivotally connected to the member **14** of the side frame C and also to the member **10** of the side frame B. A pivot pin **26** secured to a U-shaped bracket **28**, which embraces the member **14** and which is movably secured thereto by a pivot pin **30**, connects the member **4** to the member **14**, and a pivot pin **32** secured to a U-shaped bracket **34**, which embraces the member **10** and which is movably secured thereto by a pivot pin (not shown), connects the member **4** to the member **10**.

The connection of the bottom X-like frame A to the side frames B and C in this manner enables the members of each frame to move relative to one another and also enables the frames to move relative to one another, as will be hereinafter explained.

The pivot pin **6** interconnecting the members **2** and **4** of bottom X-like frame A carries a stirrup **36**, the legs **36A** and **36B** whereof are pivotally secured to cranked ends of members **38** and **40** of the handle supporting member D by means of pivot pins **42** and **44**. The other (upper in the drawings) ends of members **38** and **40** are secured to a latching member **46** which will be hereinafter be described in detail.

The members **38** and **40** carry a U-shaped stirrup **48**, the arms of which are pivotally secured to the arms **50** and **52** of the handle E by pivot pins **54**. The arms **50** and **52** of handle E carry a latch bar **56**, the ends of which are pivotally secured by brackets **58** and **60** and associated pivot pins — the pivot pin associated with bracket **58** being inicated by reference numeral **62** in FIG. **4** — to the upper (in the drawings) ends of members **8** and **14** of side X-like frames B and C. Also secured to the latch bar **56** is a plate **64** having recesses **66** therein for locating the members **38** and **40** in the erected condition of the structure.

The ends of the members **8, 10, 14** and **16** each carry a spindle respectively referenced **68, 70, 72** and **74**, the spindles carrying double wheel assemblies **76, 78, 80** and **82**, the wheel assemblies **78** and **82** each having a combined stabiliser/brake assembly **84**, one of which is shown in detail in FIGS. **8** and **9**. Referring to those Figures, in which one of the wheels has been removed for clarity, each stabiliser/brake assembly **84** comprises a hollow triangular member **86** which is pivotally secured to the member **10** of side frame B — member **16** of side frame C — by means of a pivot pin **88** which carries a coil spring **90**, the ends of which engage the triangular member **86** and the associated spindle **70** so that the triangular member **86** is biassed to the position shown in FIG. **8**. The triangular member **86** has a recess **92** in one surface which, when the member is in its FIG. **8**, i.e., in an inoperative position, embraces the spindle **70** so that the member **86** does not protrude too much beyond the periphery of the wheel assembly. When it is desired to raise the rear wheel assemblies clear of the ground, the triangular member **86** is moved about pivot pin **88** in the direction of arrow X so that the surface **86A** rests on the ground. To return the member **86** to its initial position the rear of the baby carriage is raised sufficient to allow the member **86** to rotate about pivot pin **88** under the influence of spring **90**.

Referring now to FIGS. **6** and **7**, the latching member **46** is pivotally secured to the members **38** and **40** by a pivot pin **94** and the sides **96** and **98** each have a recess therein — one such recess being indicated by reference number **100** in FIG. **7**, the other such recess being indicated by reference numeral **102** in FIG. **10**. Pivotally secured to the centre portion of the latching member **46**, by means of a bracket **104** and pivot pin **106**, is a safety catch **108** which includes a finger grip portion **108A** and which is connected to the pivot pin **94** by a coil spring **110** so that the safety catch is biassed towards the pivot pin **94**. FIG. **6** shows the latching member in its engaged position, i.e., when thestructure is in an erected condition, in which it will be seen that the recesses **100** and **102** of the latching member are in engagement with the bar **56** and the safety catch **108** in engagement with the plate **64**. With the safety catch in this position, the latching member **46** cannot be moved to release the bar **56** from the recesses **100** and **102** and hence inadvertent movement of the latching member is prevented. To release the latch bar **56** to facilitate collapse of the structure the safety catch **108** is moved in the direction of arrow Y (FIG. **6**) about the pivot pin **106** and against the bias of the spring **110** to its position shown in chain line, whereafter pressure in the direction of arrow Z may be applied to the latching member **46** to cause the latter to release the bar **56**, the latching member **46** being moved against the bias of a spring **94A**.

The collapsible structure described above has detachably secured thereto a collapsible seating unit comprising a seat portion **112**, back and head rest portion **114** and side portions **116** and **118**, the seating unit being supported on the members **8, 10** and **14, 16** of the side frames B and C and by the arms **50** and **52** of the handle E. A collapsible foot rest **120** is secured adjacent the forward extremities of the members **2** and **4** of the bottom X-like frame A, and a hand grip **122** is provided on the handle E.

To transform the erected baby carrage of FIG. **1** into the collapsed, easily carried form shown in FIG. **11**, the safety catch **108** is moved out of engagement with the plate **64** whereafter the latching member **46** is disengaged from the bar **56** as previously described. The handle E is then moved in the direction of Arrow F (FIG. **4**). which causes the arms **50** and **52** of handle E to pivot about pivot pins **54** and **62** to assume the position shown in FIG. **10**. Further movement of handle E in the direction of arrow F causes interpivotting of the members **8, 10** and **14, 16** of side frames B and C in vertical planes and the simultaneous interpivotting, owing to the previously described pivotal connections, of the members **2** and **4** of bottom frame A in a horizontal plane so that the ends of members **2** and **4** come close together.

This closing together of the ends of members **2** and **4**, due to their connections with the members **8, 10** and **14, 16** of side frames B and C, also causes said side frames B and C to move towards each other with the result that when the structure is fully collapsed the side frames B and C lie in the same general horizontal plane which also contains the collapsed bottom frame A. In the fully collapsed condition illustrated in FIG. **11**, the head rest portion of the seating unit overlies the back rest portion within the handle E overlying the seating unit and the collapsed frames A, B and C.

Thus, we provide a collapsible structure which is easily and readily collapsed in a matter of seconds, and which when collapsed is easily and conveniently carried and stored, and which when erected provides a sturdy support for the seating unit of the baby carriage.

It will be appreciated that the seating unit illustrated in the accompanying drawings and described with reference thereto, may be in the form other than shown, and indeed that the structure of the invention may be applied to other forms of carriages, not necessarily restricted to use for babies and infants.

We claim:

1. In a collapsible structure of the type having

1. a pair of side frames, each side frame including two members pivotally interconnected intermediate their ends to form an X-like foldable frame, corresponding members of the two side frames being spaced apart and substantially parallel to each other in the erected state of the structure,
2. a bottom frame having two members connected intermediate their ends by pivotal means to form an X-like foldable frame, the bottom frame extending between the two side frames and being pivotally connected to the members thereof whereby folding of the members of the bottom frame is accompanied by folding of the members of the side frames, and
3. means for locking the structure in its erected state, the improvement wherein the means for locking the structure in its erected state comprises
   a. a latch bar extending between and attached to a member of each side frame,
   b. a handle support pivotally connected to the pivotal means of the bottom frame whereby the handle support can be swung toward and away from the latch bar,
   c. a handle pivotally secured to the handle support whereby the handle can be moved toward and away from the bottom X-like frame, and
   d. a latch carried on the handle support, the latch being adapted to engage the latch bar to lock the structure in its erected state.

2. The improvement according to claim **1,** wherein the handle is secured to the latch bar in a manner permitting the handle to rotate about the latch bar as an axis.

3. The improvement according to claim **2,** wherein the latch bar is pivotally attached to each side frame by means permitting the side frames to pivot relative to the latch bar.

* * * * *