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ES-U-21 817 3
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ES-U-22 122 2
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ES-U-22 386 8
ES-U-22 411 2
ES-U-22 789 3
ES-U-22 837 7
ES-U-22 930 1
ES-U-23 193 9
FR-A-2 318 774
FR-A-2 349 485
FR-A-2 352 703
FR-A-2 358 306

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Description

Owen Finlay Maclaren has developed highly successful chairs which fold compactly in the back to front sense and simultaneously in the side to side sense of the chairs, of which the push chairs described in U.K. Patent Specification No. 1 154 362 are examples. The chairs illustrated in that specification are each braced in the lateral, namely side to side, sense of the chair frame, partly by two foldable X-frames. One of these X-frames constitutes a bottom frame of the chair frame whereas the other X-frame constitutes the back frame of the chair. The two X-frames are pivotally interconnected by connections at their adjacent corners and by upright side frames which flank the X-frames. The X-frames, when being folded, elongate in a sense away from their adjacent corners, but can be held in a laterally extended condition by interpivotted struts which themselves can be locked in an extended condition. These struts also contribute to bracing of the chair frame in the side to side sense. This mode of bracing is very satisfactory.

A second known chair frame is disclosed in Spanich Utility Model No. ES-U-222 387 which comprises:

two base members which are pivotally interconnected to form a laterally collapsible X-frame in which the opposite ends of the two base members provide front and back corners of the X-frame; two back members which are disposed on coplanar axes and respectively extend upwardly from pivotal connections at the back corners of the X-frame; two lower brace members respectively pivoted, at their lower ends, to the front corners of the X-frame; two upper brace members respectively pivoted, at their upper ends, to the upper ends of the back members; two knuckle joints respectively connecting the two lower brace members to the two upper brace members so as to prevent folding of the back members towards the X-frame when the chair frame is extended with the lower brace members respectively extending substantially colinearly with the upper brace members and the front or rear corners of the X-frame are held apart, but to allow the knuckle joints to move towards the back corners of the X-frame, thus permitting folding of the back members towards the X-frame when the back corners of the X-frame are allowed to move towards each other; two seat support members respectively pivoted to members constituting the chair frame at or adjacent the back corners of the X-frame and respectively pivoted to the lower brace members between the knuckle joints and the front corners of the X-frame; two upwardly extending back rest members which are disposed on coplanar axes and form part of a laterally collapsible back rest, respectively supported on the two seat support members and respectively mounted for pivotal movement so that the upper ends of the back rest members are movable between upper and lower positions and strut means extending between the back members and forming therewith a laterally collapsible bracing frame which can be locked to hold the back corners of the X-frame apart; the bracing frame being located adjacent the X-frame so that the back rest members can be moved between their upper and lower positions without being obstructed by the collapsible bracing frame.

The upper ends of the bracing X-frame cannot themselves be connected to pivot at fixed locations on the parallel chair back elements because the bracing X-frame, when being folded, must be allowed to elongate away from its lower ends at the back corners of the bottom X-frame, and this gives rise to the problem or reconciling the need to connect the upper ends of the bracing X-frame to the chair back elements and to permit elongation of the bracing frame during folding, with the desirability of optimum stiffening of the chair frame, in particular the chair back, in the side to side sense.

In order to deal with this problem, it has been proposed that the bracing frame formed by unfolding the oblique struts should be of X-form, known per se, or of an X truncated to an inverted V-form, and the interconnection between the oblique struts locates a connection which comprises a pair of links, each such link being supported on a respective first pivot at one end of the link at a fixed location on a respective chair back element, the fixed location beng remote from the respective back corner of the bottom X-frame, and each such link being pivotally connected remote from the first pivot of the link, indirectly to the interconnection between the oblique struts.

Furthermore the hereinbefore described second known chair frame also has a pair of equal seat back elements of rigid elongate form arranged between the side frames, each such seat back element having an upper end and a lower end, one such seat back element being pivoted by its lower end on one of the seat support elements, and the other such seat back element being pivoted by its lower end on the other seat support element, there being a second pair of oblique struts provided for bracing the seat back elements in the side to side sense when in an extended condition, the second pair of oblique struts having an interconnection about which to pivot relatively to each other and being arranged to unfold to supply a second bracing frame of X-form which extends between the side frames, the interconnection between the second pair of oblique struts being located in a fixed position in relation to the seat back elements when the chair frame is in an extended condition, the second pair of oblique struts thereby being located so that the struts thereof are inclined in opposite senses to each other and oblique to the seat back elements, the second bracing frame having upper ends with connections which allow pivoting of the upper ends of the second bracing frame in relation to the seat back elements, and

having lower ends with fixed locations in which to pivot in relation to the side frames and to the seat back elements.

A problem, similar to that described hereinbefore, exists, in stiffening the seat back elements of the chair frame in the side to side sense.

Referring now to ES-U-218 518 there is shown therein a chair frame including a seat back bracing frame comprising two substantially identical parallelogram linkages each formed by respective struts pivotally connected to respective back rest members and to a common member disposed parallel to the back rest members, the common member forming a guide for a slide arranged to limit movement of the parallelogram linkages. The prior art provides for a controlled operation of the parallelogram linkages but is complicated in construction in that a projection is required on the common member of the linkages. The invention on the other hand eliminates any need for a projection at an intermediate position on the common member. (Claim 1).

Moreover, ES-U-218 518 which discloses another form of seat frame does not disclose a seat arrangement movable between forward and rearward positions in which the back rest members have lower ends which are respectively pivoted to two seat side members, which overlie the two seat support members, each seat side member being connected to the seat support member which it overlies by at least two equal length parallel links which together with the seat side members and the seat support member together form a parallelogram linkage so that when the upper ends of the back rest members are in their lower positions, the seat side members may be moved from a rearward to a forward position, as in the present invention. (Claim 3).

The objects of this invention are to provide a foldable chair frame which alleviates the above-mentioned difficulties.

According to a first aspect of the invention, there is provided a chair frame of elongate rigid members which are interpivotted and foldable into a compact bundle in which the rigid members extend substantially parallel to each other, the chair frame comprising; two base members which are pivotally interconnected to form a laterally collapsible X-frame in which the opposite ends of the two base members provide front and back corners of the X-frame; two back members which are disposed on coplanar axes and respectively extend upwardly from pivotal connections at the back corners of the X-frame; two lower brace members respectively pivoted, at their lower ends, to the front corners of the X-frame; two upper brace members respectively pivoted, at their upper ends, to the upper ends of the back members; two knuckle joints respectively connecting the two lower brace members to the two upper brace members so as to prevent folding of the back members towards the X-frame when the chair frame is extended with the lower brace members respectively extending substantially colinearly with the upper brace members and the front or rear corners of the X-frame are held apart, but to allow the knuckle joints to move towards the back corners of the X-frame, thus permitting folding of the back members towards the X-frame when the back corners of the X-frame are allowed to move towards each other; two seat support members respectively pivoted to members consituting the chair frame at or adjacent the back corners of the X-frame and respectively pivoted to the lower brace members between the knuckle joints and the front corners of the X-frame; two upwardly extending back rest members which are disposed on coplanar axes and form part of a laterally collapsible back rest, respectively supported on the two seat support members and respectively mounted for pivotal movement so that the upper ends of the back rest members are movable between upper and lower positions and strut means extending between the back members and forming therewith a laterally collapsible bracing frame which can be locked to hold the back corners of the X-frame apart, the bracing frame being located adjacent the X-frame so that the back rest members can be moved between their upper and lower positions without being obstructed by the collapsible bracing frame; characterised in that two substantially identical parallelogram linkages each formed by respective struts are pivotally connected to respective back members and to a common member disposed parallel to the back members; and in that the common member forms a guide for a slide arranged to limit movement of the parallelogram linkages by abutment of the slide with respective struts when the chair frame is extended.

The slide may be pivotally connected to one end of two obliquely disposed supporting members having their other ends connected to back members adjacent respective back corners of the X-frame.

According to a second aspect of the invention there is provided a chair frame of elongate rigid members which are interpivotted and foldable into a compact bundle in which the rigid members extend substantially parallel to each other, the chair frame comprising; two base members which are pivotally interconnected to form a laterally collapsible X-frame in which the opposite ends of the two base members provide front and back corners of the X-frame; two back members which are disposed on coplanar axes and respectively extend upwardly from pivotal connections at the back corners of the X-frame; two lower brace members respectively pivoted, at their lower ends, to the front corners of the X-frame; two upper brace members respectively pivoted, at their upper ends, to the upper ends of the back members; two knuckle joints respectively connecting the two lower brace members to the two upper brace members so as

to prevent folding of the back members towards the X-frame when the chair frame is extended with the lower brace members respectively extending substantially colinearly with the upper brace members and the front or rear corners of the X-frame are held apart, but to allow the knuckle joints to move towards the back corners of the X-frame, thus permitting folding of the back members towards the X-frame when the back corners of the X-frame are allowed to move towards each other; two seat support members respectively pivoted to members consituting the chair frame at or adjacent the back oorners of the X-frame and respectively pivoted to the lower brace members between the knuckle joints and the front corners of the X-frame; two upwandly extending back rest members which are disposed on coplanar axes and form part of a laterally collapsible back rest, respectively supported on the two seat support members and respectively mounted for pivotal movement so that the upper ends of the back rest members are movable between upper and lower positions and strut means extending between the back members and forming therewith a laterally collapsible bracing frame which can be locked to hold the back corners of the X-frame apart, the bracing frame being located adjacent the X-frame so that the back rest members can be moved between their upper and lower positions without being obstructed by the collapsible bracing frame; characterised in that: the back rest members have lower ends which are respectively pivoted to two seat side members which respectively overlie the two seat support members, and each seat side member is connected to the seat support member which it overlies by at least two equal length parallel links which, together with said seat side members and said seat support member form a parallelogram linkage so that when the upper ends of the back rest members are in their lower positions, the seat side members may be moved from a rearward position into a forward position.

In addition, the upper ends of the back rest members may extend through the space between the two back members when supported in their lower positions, but are disposed in front of the two back members when supported in their upper positions.

This embodiment of the invention has the advantage that it provides a foldable chair in which there are means for supporting a person in either the sitting or reclining position without substantially moving the position of the centre of gravity of the person relative to the base of the chair frame.

Examples of folding push-chair constructions embodying a frame according to the present invention will now be described with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figures 1 and 2 are perspective views, partly from the side, of one push-chair construction embodying the invention, showing a seat back in forward and rearward reclined positions, respectively;

Figures 3 and 4 are front and rear views, respectively, of the push-chair in the condition shown in Figure 1;

Figure 5 an end view of part of the push-chair shown in Figure 1;

Figure 6 is a perspective view of the push-chair, partly from the rear, showing the push-chair in a partly folded condition;

Figures 7 and 8 are rear and side views, respectively, of the push-chair in its fully folded condition;

Figure 9 is a side elevation of part of the push-chair;

Figures 10 and 11 are perspective views, partly from the side, of another push-chair construction embodying the invention, showing a seat back in forward and rearward reclined positions, respectively;

Figure 12 is a side elevation of a part of the push-chair shown in Figures 10 and 11;

Figure 13 is a rear view corresponding to Figure 10; and

Figures 14 and 15 are diagrammatic representations of alternative bracing frames which may be applied to Figure 4 or Figure 13.

Best Modes for carrying out the Invention

Referring in the first instance to Figures 1 to 9 of the drawings, the folding push-chair is supported on wheels 10 and is constructed of elongate rigid members which are interpivotted and foldable into a compact bundle.

The push-chair frame comprises a bottom X-frame 11 which extends in a plane from back to front of the chair. The members 11*a* of the X-frame 11 are interconnected by a central pivot pin 11*b* and the frame 11 is foldable in the plane mentioned.

The chair further comprises a pair of identical side frames whose planes extend upwardly. The side frames are pivotally interconnected with respective front corners 11*c* and respective back corners 11*d* of the bottom X-frame 11, for pivoting and folding about the front and back corners 11*c* and 11*d*, respectively, in the back to front sense.

Each of the side frames comprises a chair back member 12 which extends upwardly away from a back corner 11*d*, member 12 of one side frame being coplanar with the member 12 of the other side frame. Each side frame further comprises a pair of interpivotted bracing members, namely a lower brace member 13 and an upper brace

member 14, and a seat supporting member 15.

The brace members 13 and 14 of each side frame slope upwardly and back between the respective front corner 11*c* of the bottom X-frame 11 and the upper end of the respective chair back member 12. The members 13 and 14 are interconnected by a knuckle joint 16. There is a pivot connection 17 between the lower brace member 13 and the respective front corner 11*c* of the X-frame 11 and a pivot connection 18 between the upper brace member 14 and the upper end of the respective chair back member 12. Each upper brace member 14 has an extension to provide a pair of handles 19 for pushing the chair, or for carrying it folded.

Each seat support member 15 extends between the respective back corner 11*d* of the X-frame 11, and the respective lower brace member 13, the member 15 being pivotally connected to the back corner 11*d*. The member 15 is also connected to the member 13 by a pivot connection 15*a* located between the knuckle joint 16 and the pivot connections 17. The member 15 in each side frame thereby ensures that folding of each side frame and of the bottom X-frame 11 takes place simultaneously.

Two pairs of locking struts 20 and 23, respectively connected by pivot pins 20*a* and 26, have their opposite ends pivotally connected to spaced portions of the back members 12 by pivot pins 20*b* and 25 and are interconnected by means of a guide link 24 to form a laterally collapsible bracing frame 60 consisting of two identical parallelogram linkages. Stop means are provided in the form of a slider 22, which is able to slide up and down guide link 24, and two supporting struts 21 which are pivotally connected to the slider 22 and to the pivots 20*b* to support the slider 22 relative to the back members 12 so that the two pairs of locking struts 20 and 23 are simultaneously movable into and out of an overcentre locking condition in which the frame members are held apart with the push-chair in its extended condition, as shown in Figure 1 and 2. For convenience, a knob 20*c* can be provided on the pivot pin 20*a* for foot operation of the laterally collapsible bracing frame 60.

Figure 4 shows the laterally collapsible bracing frame 60 in an extended condition, the slider 22 being adjacent to the locking struts 23. Figure 6 shows the laterally collapsible bracing frame 60 partially collapsed and the slider 22 spaced from the locking struts 23.

An auxiliary pair of centre-locking or overcentre-locking struts 27 interpivotted at 27*a* is pivotally connected by its outer end to the upper brace members 14, between the handles 19 and the pivot connections 18, in order to stiffen and secure the upper part of the chair frame. The struts 27 are shown extended in Figure 4, for example, and partially folded in Figure 6.

The front corners 11*c* of the bottom X-frame 11 are tied by a flexible strap 28 which provides a footrest.

The push-chair also includes a sheet of fabric which is supported by two seat side members 29*a* and by two back rest members 29*b* respectively connected to the seat side members 29*a* by means of pivot pins 30 and brackets 30*a* attached to the seat side members 29*a*. The back rest members 29*b* are thereby inclinable in a sense parallel to the side frames when the chair is in extended condition. The members 29*b* are primarily for stiffening and controlling reclining of a fabric seat back 31 of a fabric seat 32 extending between the seat support members 15 and fastened to the seat side members 29*a*, but also contribute to stiffening the chair frame in the side to side sense, particularly be resisting forces imposed in that sense by an infant seated in the chair.

As shown in Figures 1 and 2, each seat side member 29*a* is pivotally connected to a respective seat supporting member 15 by means of six identical links 50, the rearmost four of which are attached to opposite sides of the rearmost end of the seat member 29*a*. It is thereby possible to swing the seat side members 29*a* between rearward and forward positions, respectively shown in Figures 1 and 2 in which they rest on the seat supporting members 15. This allows the seat side members 29*a* to be moved forwardly when the back rest members 29*b* are lowered, as shown in Figure 2, so that when the back rest members 29*b* are lowered, the centre of gravity of a child reclining on the fabric sheet supported by the seat members 29*a* and the back rest members 29*b* remains substantially midway between the front and rear wheels 10.

The seat back rest members 29*b* (see Figure 4) are braced in the side to side sense by a second X-frame 70 which extends between the side frames. The second X-frame comprises a pair of intersecting members 33 having a pivot pin 34 about which to pivot relatively to one another. The lower ends of the second X-frame 70 are connected by pivots 35 at fixed locations on the back rest members 29*b* themselves. The second X-frame 70 also has a connection at its upper ends which allows these ends to pivot in relation to the members 29*b*, but this connection is indirect, being by means of a pair of seat back links 36.

In practice the pivot pin 34 needs a slightly oversize hole in which to operate, because the pivot pin 34 moves perceptibly eccentrically in relation to the hole during folding and unfolding of the push-chair.

Each link 36 is connected to a respective back rest member 29*b* by a first pivot pin 37 at the outer end of the link at an upper fixed location on the member 29*b* remote from the lower fixed location of pivot pin 35 on the same member. The links 36 are interconnected by a second pivot pin 38. Each of the upper ends of the second X-frame 70 is connected to a respective link 36 by a third pivot pin 39 between the first pivot pin 37 which supports the link 36 on the respective back rest

member 29*b*, and the second pivot pin 38 which interconnects the links 36. Each link 36 is thus pivotally connected indirectly through the respective pivot pin 39 to the interconnection provided by the pivot pin 34. The interconnection provided by the pivot pin 34 locates the links 36 and is fixed in relation to each pivot pin 35 and each member 29*b* when the push-chair is sustained in an extended condition by the locking struts 20 and 23.

The two links 36 are respectively formed with an optional extension 36*a* and 36*b*, as shown in Figure 5, which extend beyond the second pivot 38, the extensions 36*a* and 36*b* of each link overlapping the other link when the links 36 are in an extended condition, one of the link extensions 36*a* engaging in a gap 40 formed between the other link and the respective upper end of one of the members 33 of the second X-frame 70.

As can be seen in Figure 4, the second pivot pin 38 which interconnects the links 36 is disposed above a horizontal line between each of the third pivot pins 39 so that, without manipulation, folding of the second X-frame 70 will accompany folding of the rest of the push-chair.

The members 33 of the second X-frame 70 and the links 36 are preferably of stiff plastics strip so that they will fold compactly. The heads of the pivot pins 34, 35 and 37 to 39 can be seated in countersunk depressions.

The upper ends of the back rest members 29*b* are tied to the chair back elements 12 by a pair of rigid links 41 (see Figure 9) which can be manipulated to sustain the members 29*b* in a forward position as in Figure 1 and in a reclined position as shown in Figure 2. The links 41 are arranged between and adjacent to the side frames. Each link 41 is formed at one end with a hole for receiving a first pivot pin 43 on respective member 29*b* and with a slot 44 which extends along the link 41 from the other end thereof. The slot 44 receives a second pivot pin 45 carried by a bracket 12*a* mounted on the respective member 12. One end of each pivot pin 45 is screw threaded and fitted with an internally screw threaded knob 45*a*.

In order to convert the push-chair from the arrangement shown in Figure 1 to the arrangement shown in Figure 2, the knobs 45*a* are first loosened, to allow the links 41 to rotate about the pivot pins 45 and to allow the slots 44 to slide along the pivot pins 45. The seat side members 29*a* are then swung forward on the links 50 and, finally, the back rest members 29*b* are lowered and the knobs 45a are re-tightened. The reverse procedure may be adopted to return the push-chair to the arrangement shown in Figure 1. However, in this case, it is possible to return the seat side members 29*a* to their rear position before raising the back rest members 29*b*.

Assuming that the chair is initially as in Figure 1, in the extended condition, the auxiliary strut pair 27 is unlocked with one hand, the knob 20*c* kicked up to unlock the lower strut pair 20 and, by consequential upward thrusting movement of the guide link 24 on pivot pin 26, to cause locking struts 23 to fold. Such movement of the guide link 24 is in relation to the slider 22 which disengages from the locking struts 23. Simultaneously with this disengagement of the slider 22, the oblique struts 21 pivot on the slider 22 and on the back corners 11*b* of the bottom X-frame 11 with consequential folding of the pair of oblique struts 21.

Then, by swinging the upper brace members 14 forward about the knuckle joints 16, folding of the other chair frame parts proceeds through the intermediate stage indicated by Figure 6, side to side folding of the X-frame 11 and forward folding of the side frames occurring simultaneously because of interconnections with the seat support members 15, to a final fully folded state indicated by Figures 7 and 8.

The chair frame is unfolded by reversal of the above procedure and finally locked by the pairs of struts 20, 23 and 27.

It will be noted that, in figures 1 to 8, the chair back members 12 carry the rear pairs of wheels 10. However, the construction shown could be modified by extending the seat support members 15 rearwards beyond the back corners 11d and mounting the rear pairs of wheels 10 suitably on the rearward extensions of the members 15, the lower ends of the chair back members 12 would terminate at the back corners 11d.

The push-chair shown in figures 10 to 13 differs from that shown in Figures 1 to 9 in that the rigid links 41 are in the form shown in detail in Figure 12. Each link 41 is formed at one end with a hole 42 for receiving a first pivot pin 43 on the respective back rest member 29b and with an L-slot 44 which extends along the link 41 from the other end thereof. The slot 44 receives a second pivot pin 45 on the respective chair back member 12. The foot 58 of the slot 44 is located adjacent to the other end of the link 41 formed with the hole 42, and is directed upwardly so that the link 41 can pivot about the first pivot pin 43 and engage the second pivot pin 45 by the foot 58 of the slot 44. The back rest members 29b are thereby maintained in the forward position.

The back rest members 29b are released for movement into the reclined position by pivoting each link 41 upwards individually by hand about the first pivot pin 43, thereby disengaging the foot 58 of the slot 44 from the pivot pin 45. As each back rest member 29b leans back from the vertical position, with each link continuing the pivoting movement started by hand, the pivot pin 43 approaches and then passes underneath the pivot pin 45 as the back rest members 29b move from the forward position shown in Figure 10 to the reclined position shown in Figure 11, finally coming to rest when the pivot pins 43 and 45 become separated by the full extent allowed by the L-slot 44.

The back rest members 29b are restored to forward position merely by hand pressure on the

seat back, each link 41 reversing its own pivoting movement as the back rest members 29b pivoted forwardly until finally the pivot pin 45 engages the foot 58 of the slot 44.

The collapsible bracing frames 70 shown in Figure 4 and Figure 13 may be replaced by either of the bracing frames of X-form shown diagrammatically in Figures 14 and 15, to which the same reference numerals are applied to the bracing frame and links to indicate the correspondence. However, the seat back links 36' in Figures 14 and 15 are shorter than the seat back links 36 in Figure 4 or Figure 13, the links 36' merely connecting the pivots 37, 39'. Thus, in Figure 14, the bracing frame 70, comprising intersecting members 33 located on pivot pin 34, has two upper ends and each of links 36' is connected to a respective upper end of the bracing frame by a pivot 39'.

Figure 15 shows one pivot 39' tied to the corresponding pivot 39' at the upper end of the bracing frame 70 by an auxiliary pair of interpivotted links 46 extending between the ends of the bracing frame.

The locking struts 20 and auxiliary struts 27 are retained in the chair back in any of the modifications above described.

Although reference numerals have been used in the appended claims to improve the intelligibility of these claims, it is expressly stated that these reference numerals should not be construed as limiting the claims to the constructions illustrated in the accompanying drawings.

Claims

1. A chair frame of elongate rigid members which are interpivotted and foldable into a compact bundle in which the rigid members extend substantially parallel to each other, the chair frame comprising; two base members (11a) which are pivotally interconnected to form a laterally collapsible X-frame (11) in which the opposite ends (11c and 11d) of the two base members (11a) provide front and back corners of the X-frame; two back members (12) which are disposed on coplanar axes and respectively extend upwardly from pivotal connections at the back corners (11d) of the X-frame (11); two lower brace members (13) respectively pivoted, at their lower ends, to the front corners (11c) of the X-frame (11); two upper brace members (14) respectively pivoted, at their upper ends, to the upper ends of the back members (12); two knuckle joints (16) respectively connecting the two lower brace members (13) to the two upper brace members (14) so as to prevent folding of the back members (12) towards the X-frame (11) when the chair frame is extended with the lower brace members (13) respectively extending substantially colinearly with the upper brace members (14) and the front or rear corners (11c or 11d) of the X-frame (11) are held apart, but to allow the knuckle joints (16) to move towards the back corners (11d) of the X-frame (11), thus permitting folding of the back members (12) towards the X-frame (11) when the back corners (11d) of the X-frame (11) are allowed to move towards each other; two seat support members (15) respectively pivoted to members consituting the chair frame at or adjacent the back corners (11d) of the X-frame (11) and respectively pivoted to the lower brace members (13) between the knuckle joints (16) and the front corners (11c) of the X-frame (11); two upwardly extending back rest members (29b) which are disposed on coplanar axes and form part of a laterally collapsible back rest, respectively supported on the two seat support members (15) and respectively mounted for pivotal movement so that the upper ends of the back rest members (29b) are movable between upper and lower positions and strut means extending between the back members (12) and forming therewith a laterally collapsible bracing frame (60) which can be locked to hold the back corners (11d) of the X-frame (11) apart, the bracing frame (60) being located adjacent the X-frame (11) so that the back rest members (29b) can be moved between their upper and lower positions without being obstructed by the collapsible bracing frame characterised in that two substantially identical parallelogram linkages each formed by respective struts (20 and 23) are pivotally connected to respective back members (12) and to a common member (24) disposed parallel to the back members (12), and in that the common member (24) forms a guide for a slide (22) arranged to limit movement of the parallelogram linkages by abutment of the slide with respective struts (23) when the chair frame is extended.

2. A chair frame as claimed in Claim 1, characterised in that the slide (22) is pivotally connected to one end of two obliquely disposed supporting members (21) having their other ends connected to back members (12) adjacent respective back corners (11d) of the X-frame (11).

3. A chair frame of elongate rigid members which are interpivotted and foldable into a compact bundle in which the rigid members extend substantially parallel to each other, the chair frame comprising; two base members (11a) which are pivotally interconnected to form a laterally collapsible X-frame (11) in which the opposite ends (11c and 11d) of the two base members (11a) provide front and back corners of the X-frame; two back members (12) which are disposed on coplanar axes and respectively extend upwardly from pivotal connections at the back corners (11d) of the X-frame (11); two lower brace members (13) respectively pivoted, at their lower ends, to the front corners (11c) of the X-frame (11); two upper brace members (14) respectively pivoted, at their upper ends, to the upper ends of the back members (12); two knuckle joints (16) respectively connecting the two lower brace members (13) to the two upper

brace members (14) so as to prevent folding of the back members (12) towards the X-frame (11) when the chair frame is extended with the lower brace members (13) respectively extending substantially colinearly with the upper brace members (14) and the front or rear corners (11c or 11d) of the X-frame (11) are held apart, but to allow the knuckle joints (16) to move towards the back corners (11d) of the X-frame (11), thus permitting folding of the back members (12) towards the X-frame (11) when the back corners (11d) of the X-frame (11) are allowed to move towards each other; two seat support members (15) respectively pivoted to members consituting the chair frame at or adjacent the back corners (11d) of the X-frame (11) and respectively pivoted to the lower brace members (13) between the knuckle joints (16) and the front corners (11c) of the X-frame (11); two upwardly extending back rest members (29b) which are disposed on coplanar axes and form part of a laterally collapsible back rest, respectively supported on the two seat support members (15) and respectively mounted for pivotal movement so that the upper ends of the back rest members (29b) are movable between upper and lower positions and strut means extending between the back members (12) and forming therewith a laterally collapsible bracing frame (60) which can be locked to hold the back corners (11d) of the X-frame (11) apart, the bracing frame (60) being located adjacent the X-frame (11) so that the back rest members (29b) can be moved between their upper and lower positions without being obstructed by the collapsible bracing frame; characterised in that: the back rest members (29b) have lower ends which are respectively pivoted to two seat side members (29a) which respectively overlie the two seat support members (15), and each seat side member (29a) is connected to the seat support member which it overlies by at least two equal length parallel links (50) which, together with said seat side members (29a) and said seat support members (15) form a parallelogram linkage so that when the upper ends of the back rest members (29b) are in their lower positions, the seat side members (29a) may be moved from a rearward position into a forward position.

4. A chair frame as claimed in Claim 3, characterised in that the upper ends of the back rest members (29b) extend through the space between the two back members (12) when supported in their lower positions, but are disposed in front of the two back members (12) when supported in their upper positions.

Patentansprüche

1. Sthulrahmen aus langen starren Elementen, die ineinanderschwenkbar und zu einem kompakten Bündel zusammenklappbar sind und im wesentlichen parallel zueinander verlaufen, umfassend:

zwei Grundstreben (11a), die schwenkbar so miteinander verbunden sind, daß sie einen seitlich zusammenklappbaren X-Rahmen (11) bilden, wobei die entgegengesetzten Enden (11c und 11d) der beiden Grundstreben (11a) vordere und hintere Ecken des X-Rahmens bilden; zwei hintere Streben (12), die auf in einer Ebene verlaufenden Achsen liegen und jeweils von Schwenkverbindungen an den hinteren Ecken (11d) des X-Rahmens (11) aufwärts verlaufen; zwei untere Streben (13), die jeweils an ihren Unterenden mit den vorderen Ecken (11c) des X-Rahmens (11) schwenkbar verbunden sind; zwei obere Streben (14), die jeweils an ihren oberen Enden mit den oberen Enden der hinteren Streben (12) schwenkbar verbunden sind; zwei Gelenkverbindungen (16), die die beiden unteren Streben (13) jeweils so mit den beiden oberen Streben (14) verbinden, daß ein Umklappen der hinteren Streben (12) zum X-Rahmen (11) hin verhindert wird, wenn der Stuhlrahmen ausgezogen ist und sich die unteren Streben (13) jeweils im wesentlichen kolinear mit den oberen Streben (14) erstrecken und die vorderen oder hinteren Ecken (11c oder 11d) des X-Rahmens (11) auseinandergehalten sind, jedoch die Gelenkverbindungen (16) in Richtung zu den hinteren Ecken (11d) des X-Rahmens (11) bewegbar sind, so daß die hinteren Streben (12) zum X-Rahmen (11) hin umfaltbar sind, wenn die hinteren Ecken (11d) des X-Rahmens (11) aufeinander zu bewegt werden können; zwei Sitzhaltestreben (15), die jeweils mit den Struhlrahmen bildenden Teilen an oder nahe den hinteren Ecken (11d) des X-Rahmens (11) und mit den unteren Streben (13) zwischen Gelenkverbindungen (16) und den vorderen Ecken (11c) des X-Rahmens (11) schwenkbar verbunden sind; zwei aufwärts verlaufende Rückenlehnenstreben (29b), die auf in einer Ebene verlaufenden Achsen liegen und Teil einer seitlich zusammenklappbaren Rücklenlehne bilden und jeweils an den beiden Sitzhaltestreben (15) abgestützt und schwenkbar so befestigt sind, daß die Oberenden der Rückenlehnenstreben (29b) zwischen einer oberen und einer unteren Position und Knickstäben bewegbar sind, die sich zwischen den hinteren Streben (12) erstrecken und mit diesem einen seitlich zusammenklappbaren Spannrahmen (60) bilden, der zum Auseinanderhalten der hinteren Ecken (11d) des X-Rahmens (11) arretierbar ist, wobei der Spannrahmen (60) angrenzend an den X-Rahmen (11) so angeordnet ist, daß die Rückenlehnenstreben (29b) zwischen ihrer oberen und ihrer unteren Position ohne Behinderung durch den zusammenklappbaren Spannrahmen (60) bewegbar sind, dadurch gekennzeichnet, daß zwei im wesentlichen identische Parallelogrammgestänge, die jeweils durch Spreizelemente (20 und 23) gebildet sind, mit jeweiligen hinteren Streben (12) und mit einem gemeinsamen Verbindungsteil (24), das

parallel zu den hinteren Streben (12) angeornet ist, schwenkbar verbunden sind, und daß das gemeinsame Verbindungsteil (24) eine Fürung für ein Gleitstück (22) bildet, das so angeordnet ist, daß es die Bewegung der Parallelogrammgestänge durch Anlage des Gleitstücks an entsprechenden Spreizelementen (23) bei ausgefahrenem Stuhlrahmen begrenzt.

2. Stuhlrahmen nach Anspruch 1, dadurch gekennzeichnet, daß das Gleitstück (22) schwenkbar mit einem Ende von zwei schräg angeordneten Stützelementen (21) verbunden ist, deren anderen Enden mit hinteren Streben (12) nahe den entsprechenden hinteren Ecken (11d) des X-Rahmen (11) verbunden sind.

3. Stuhlrahmen aus langen starren Elementen, die ineinanderschwenkbar und zu einem kompakten Bündel zusammenklappbar sind und im wesentlichen parallel zueinander verlaufen, umfassend:

zwei Grundstreben (11a), die schwenkbar so miteinander verbunden sind, daß sie einen seitlich zusammenklappbaren X-Rahmen (11) bilden, wobei die entgegengesetzten Enden (11c und 11d) der beiden Grundstreben (11a) vordere und hintere Ecken des X-Rahmens bilden; zwei hintere Streben (12), die auf in einer Ebene verlaufenden Achsen liegen und jeweils von Schwenkverbindungen an den hinteren Ecken (11d) des X-Rahmens (11) aufwärts verlaufen; zwei untere Streben (13), die jeweils an ihren Unterenden mit den voreren Ecken (11c) des X-Rahmens (11) schwenkbar verbunden sind; zwei obere Streben (14), die jeweils an ihren oberen Enden mit den oberen Enden der hinteren Streben (12) schwenkbar verbunden sind; zwei Gelenkverbindungen (16), die die beiden unteren Streben (13) jeweils so mit den beiden oberen Streben (14) verbinden, daß ein Umklappen der hinteren Streben (12) zum X-Rahmen (11) hin verhindert wird, wenn der Stuhlrahmen ausgezogen ist und sich die unteren Streben (13) jeweils im wesentlichen kolinear mit den oberen Streben (14) erstrecken und die vorderen oder hinteren Ecken (11c oder 11d) des X-Rahmens (11) auseinandergehalten sind, jedoch die Gelenkverbindungen (16) in Richtung zu den hinteren Ecken (11d) des X-Rahmens (11) bewegbar sind, so daß die hinteren Streben (12) zum X-Rahmen (11) hin umfaltbar sind, wenn die hinteren Ecken (11d) des X-Rehmens (11) aufeinander zu bewegt werden können; zwei Sitzhaltestreben (15), die jeweils mit den Struhlrahmen bildenden Teilen an oder nahe den hinteren Ecken (11d) des X-Rahmens (11) und mit den unteren Streben (13) zwischen Gelenkverbindungen (16) und den vorderen Ecken (11c) des X-Rahmens (11) schwenkbar verbunden sind; zwei aufwärts verlaufende Rückenlehnenstreben (29b), die auf in einer Ebene verlaufenden Achsen liegen und Teil einer seitlich zusammenklappbaren Rücklenlehne bilden und jeweils an den beiden Sitzhaltestreben (15) abgestützt und schwenkbar so befestigt sind, daß die Oberenden der Rückenlehnenstreben (29b) zwischen einer oberen und einer unteren Position und Knickstäben bewegbar sind, die sich zwischen den hinteren Streben (12) erstrecken und mit diesem einen seitlich zusammenklappbaren Spannrahmen (60) bilden, der zum Auseinanderhalten der hinteren Ecken (11d) des X-Rahmens (11) arretierbar ist, wobei der Spannrahmen (60) angrenzend an den X-Rahmen (11) so angeordnet ist, daß die Rückenlehnenstreben (29b) zwischen ihrer oberen und ihrer unteren Position ohne Behinderung durch den zusammenklappbaren Spannrahmen (60) bewegbar sind, dadurch gekennzeichnet, daß die Rückenlehnenstreben (29b) unteren Enden aufweisen, die jeweils schwenkbar mit zwei Sitzseitenteilen (29a), die die beiden Sitzhaltestreben (15) jeweils überlappen, verbunden sind, und jedes Sitzseitenteil (29a) mit der von ihm überlappten Sitzhaltestreben über wenigstens zwei gleich lange parallele Verbindungselemente (50) verbunden ist, die gemeinsam mit den Sitzseitenteilen (29a) und den Sitzhaltestreben (15) ein Parallelogrammgestänge bilden, so daß, wenn die oberen Enden der Rückenlehnenstreben (29b) ihre unteren Positionen einnehmen, die Sitzseitenteile (29a) aus einer hinteren in eine vordere Stellung bewegber sind.

4. Stuhlrahmen nach Anspruch 3, dadurch gekennzeichnet, daß die oberen Enden der Rückenlehnenstreben (29b), wenn sie in ihren unteren Positionen abgestützt sind, den Raum zwischen den beiden hinteren Streben (12) durchsetzen, aber bei Abstützung in ihren oberen Positionen vor den beiden hinteren Streben (12) verlaufen.

Revendications

1. Un cadre de chaise en organes rigides allongés qui sont articulés entre eux et repliables en un faisceau compact dans lequel les organes rigides s'étendent pratiquement parallèlement entre eux, le cadre de chaise comprenant; deux organes de base (11a) qui sont interconnectés à pivotement pour former un cadre en X (11) repliable latéralement dans lequel les extrémités opposées (11c et 11d) des deux organes de base (11a) forment des coins avant et arrière du cadre en X; deux organes dorsaux (12) qui sont disposés suivant des axes coplanaires et s'étendent respectivement vers le haut à partir de connexions pivotantes aux coins arrières (11d) du cadre en X (11); deux organes d'entretoise inférieurs (13) pivotant respectivement, à leurs extrémités inférieures, sur les coins avant (11c) du cadre en X (11); deux organes d'entretoise supèrieurs (14) pivotant respectivement, à leurs extrémités supérieures, sur les extrémités supérieures des organes dorsaux (12); deux articulations à genouillère (16) reliant

respectivement les deux organes d'entretoise inférieurs (13) aux deux organes d'entretoise supérieurs (14) afin d'empêcher un pliage des organes dorsaux (12) vers le cadre en X (11) quand le cadre de chaise est amené en extension avec les organes d'entretoise inférieurs (13) s'étendant respectivement pratiquement de façon colinéaire avec les organes d'entretoise supérieurs (14) et les coins avant ou arriére (11c ou 11d) du cadre en X (11) sont maintenus écartés, mais de façon à permettre aux articulations à genouillère (16) de se déplacer vers les coins arrière (11d) du cadre en X (11), en permettant ainsi un pliage des organes dorsaux (12) vers le cadre en X (11) quand les coins arrière (11d) du cadre en X (11) sont mis en mesure de se déplacer l'un vers l'autre; deux organes de support de siège (15) pivotant respectivement sur des organes constituant le cadre de chaise à l'endroit ou au voisinage des coins arrière (11d) du cadre en X (11) et pivotant respectivement sur les organes d'entretoise inférieurs (13) entre les articulations à genouillère (16) et les coins avant (11c) du cadre en X (11); deux organes de dossier s'étendant vers le haut (29b) qui sont disposés suivant des axes coplanaires et font partie d'un dossier repliable latéralement, supportés respectivement sur les deux organes de support de siège (15) et montés respectivement pour un mouvement de pivotement de telle sorte que les extrémités supérieures des organes de dossier (29b) peuvent être déplacées entre des positions supérieure et inférieure, et des moyens d'étrésillon s'étendant entre les organes dorsaux (12) et formant avec ceux-ci un châssis de croisillonement repliable latéralement (60) qui peut être verrouillé pour maintenir les coins arrière (11d) du cadre en X (11) écartés, le châssis de croisillonement (60) étant situé au voisinage du cadre en X (11) de telle sorte que les organes de dossier (29b) peuvent être déplacés entre leurs positions supérieure et inférieure sans être gênés par le châssis de croisillonement repliable, caractérisé en ce que deux embiellages en parallélogramme pratiquement identiques formés chacun par des étrésillons respectifs (20 et 23) sont reliés à pivotement à des organes dorsaux respectifs (12) et à un organe commun (24) disposé parallèlement aux organes dorsaux (12), et en ce que l'organe commun (24) forme un guide pour une coulisse (22) agencée pour limiter en se butant contre des étrésillons respectifs (23) le mouvement des embiellages en parallélogramme quand le cadre de chaise est amené en extension.

2. Cadre de chaise suivant la revendication 1, caractérisé en ce que la coulisse (22) est reliée à pivotement à une extrémité de deux organes de support (21) disposés en oblique dont les autres extrémités sont reliées aux organes dorsaux (12) au voisinage des coins arrière respectifs (11d) du cadre en X (11).

3. Un cadre de chaise en organes rigides allongés qui sont articulés entre eux et repliables en un faisceau compact dans lequel les organes rigides s'étendent pratiquement parallèlement entre eux, le cadre de chaise comprenant; deux organes de base (11a) qui sont interconnectés à pivotement pour former un cadre en X (11) repliable latéralement dans lequel les extrémités opposées (11c et 11d) des deux organes de base (11a) forment des coins avant et arrière du cadre en X; deux organes dorsaux (12) qui sont disposés suivant des axes coplanaires et s'étendent respectivement vers le haut à partir de connexions pivotantes aux coins arrières (11d) du cadre en X (11); deux organes d'entretoise inférieurs (13) pivotant respectivement, à leurs extrémités inférieures, sur les coins avant (11c) du cadre en X (11); deux organes d'entretoise supérieurs (14) pivotant respectivement, à leurs extrémités supérieures, sur les extrémités supérieures des organes dorsaux (12); deux articulations à genouillère (16) reliant respectivement les deux organes d'entretoise inférieurs (13) aux deux organes d'entretoise supérieurs (14) afin d'empêcher un pliage des organes dorsaux (12) vers le cadre en X (11) quand le cadre de chaise est amené en extension avec les organes d'entretoise inférieurs (13) s'étendant respectivement pratiquement de façon colinéaire avec les organes d'entretoise supérieurs (14) et les coins avant ou arrière (11c ou 11d) du cadre en X (11) sont maintenus écartés, mais de façon à permettre aux articulations à genouillère (16) de se déplacer vers les coins arriére (11d) du cadre en X (11), en permettant ainsi un pliage des organes dorsaux (12) vers le cadre en X (11) quand les coins arrière (11d) du cadre en X (11) sont mis en mesure de se déplacer l'un vers l'autre; deux organes de support de siège (15) pivotant respectivement sur des organes constituant le cadre de chaise à l'endroit ou au voisinage des coins arrière (11d) du cadre en X (11) et pivotant respectivement sur les organes d'entretoise inférieurs (13) entre les articulations à genouillère (16) et les coins avant (11c) du cadre en X (11); deux organes de dossier s'étendant vers le haut (29b) qui sont disposés suivant des axes coplanaires et font partie d'un dossier repliable latéralement, supportés respectivement sur les deux organes de support de siège (15) et montés respectivement pour un mouvement de pivotement de telle sorte que les extrémités supérieures des organes de dossier (29b) peuvent être déplacées entre les positions supérieure et inférieure, et des moyens d'étrésillon s'étendant entre les organes dorsaux (12) et formant avec ceux-ci un châssis de croisillonement repliable latéralement (60) qui peut être verrouillé pour maintenir les coins arrière (11d) du cadre en X (11) écartés, le châssis de croisillonement (60) étant situé au voisinage du cadre en X (11) de telle sorte que les organes de dossier (29b) peuvent être déplacés entre leurs positions supérieure et inférieure sans être gênés par le châssis de croisillonement repliable; caractérisé en ce que: les orgnes de dossier (29b) ont des extrémités inférieures sont pivotées respectivement sur deux organes latéraux de

siège (29a) qui surplombent respectivement les deux organes de support de siège (15), et chaque organe latéral de siège (29a) est relié à l'organe de support de siège qu'il surplombe par au moins deux biellettes parallèles (50) de longueur égale qui, conjointement avec lesdits organes latéraux de siège (29a) et lesdits organes de support de siége (15), forment un embiellage en parallélogramme de telle sorte que quand les extrémités supérieures des organes de dossier (29b) se trouvent dans leurs positions inférieures, les organes latéraux de siège (29a) peuvent être déplacés d'une position en arrière vers une position en avant.

4. Un cadre de chaise suivant la revendication 3, caractérisé en ce que les extrémités supérieures des organes de dossier (29b) s'étendent à travers l'espace entre les deux organes dorsaux (12) quand ils sont supportés dans leurs positions inférieures, mais sont disposées devant les deux organes dorsaux (12) quand ils sont supportés dans leurs positions supérieures.

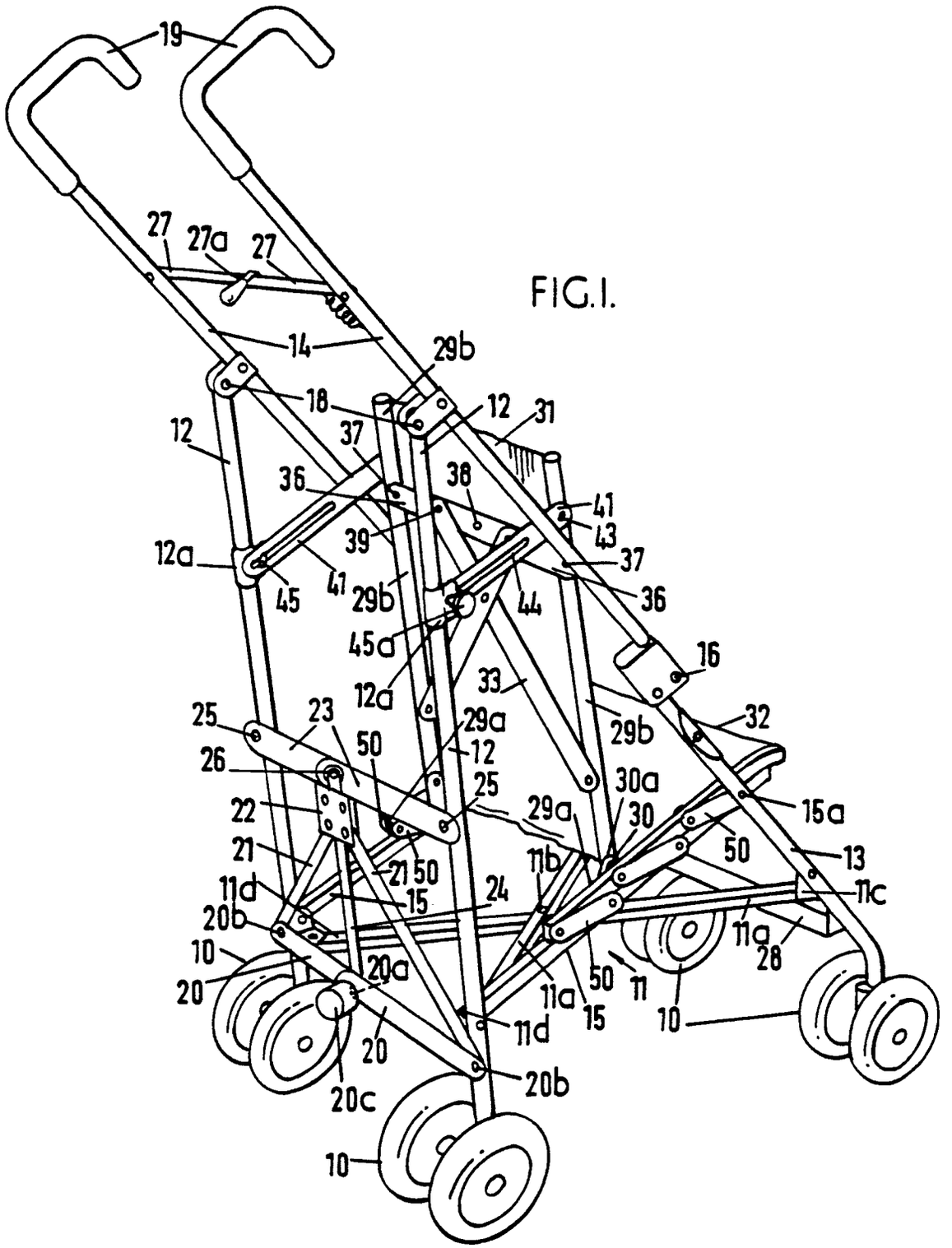
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FIG.1.

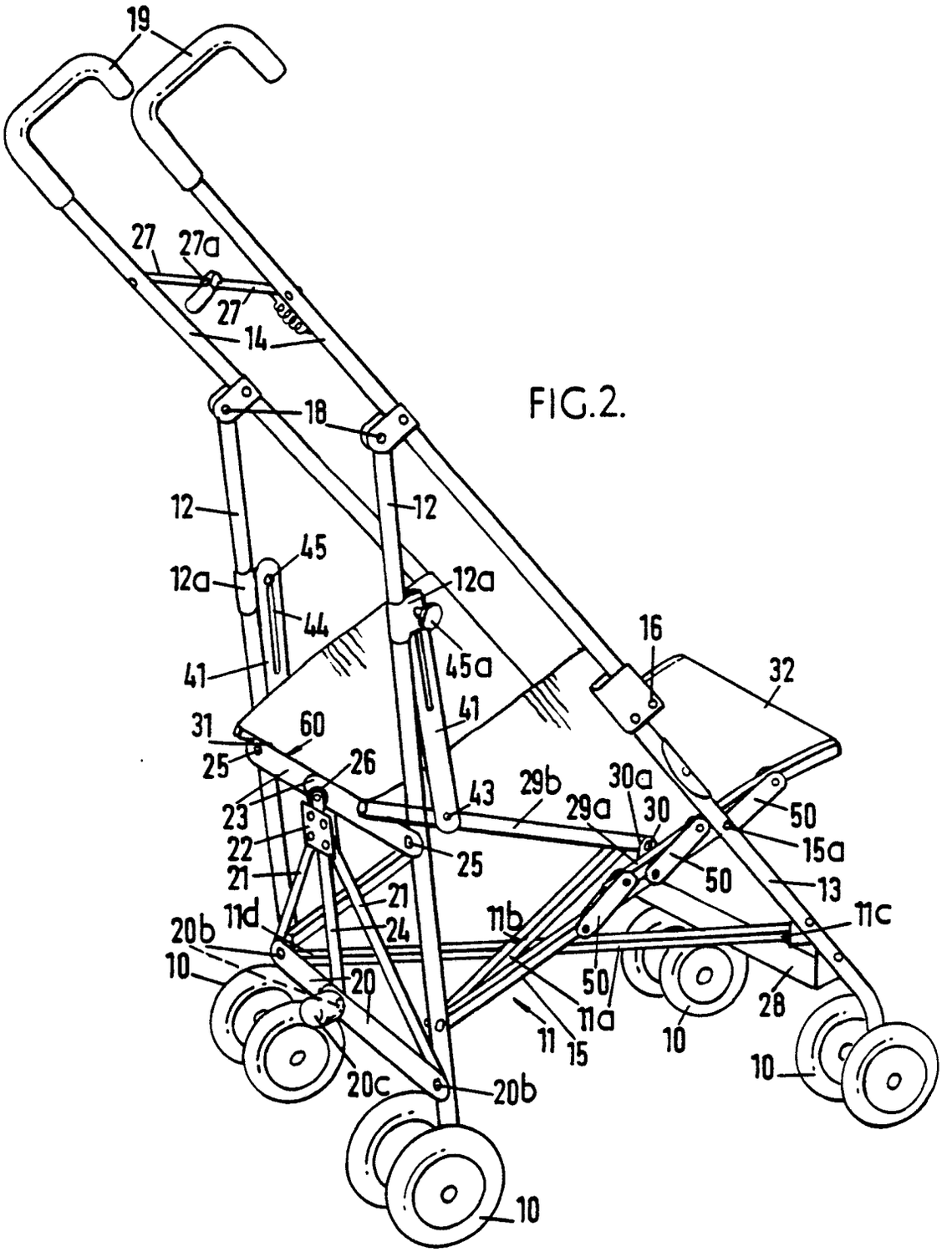
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FIG.2.

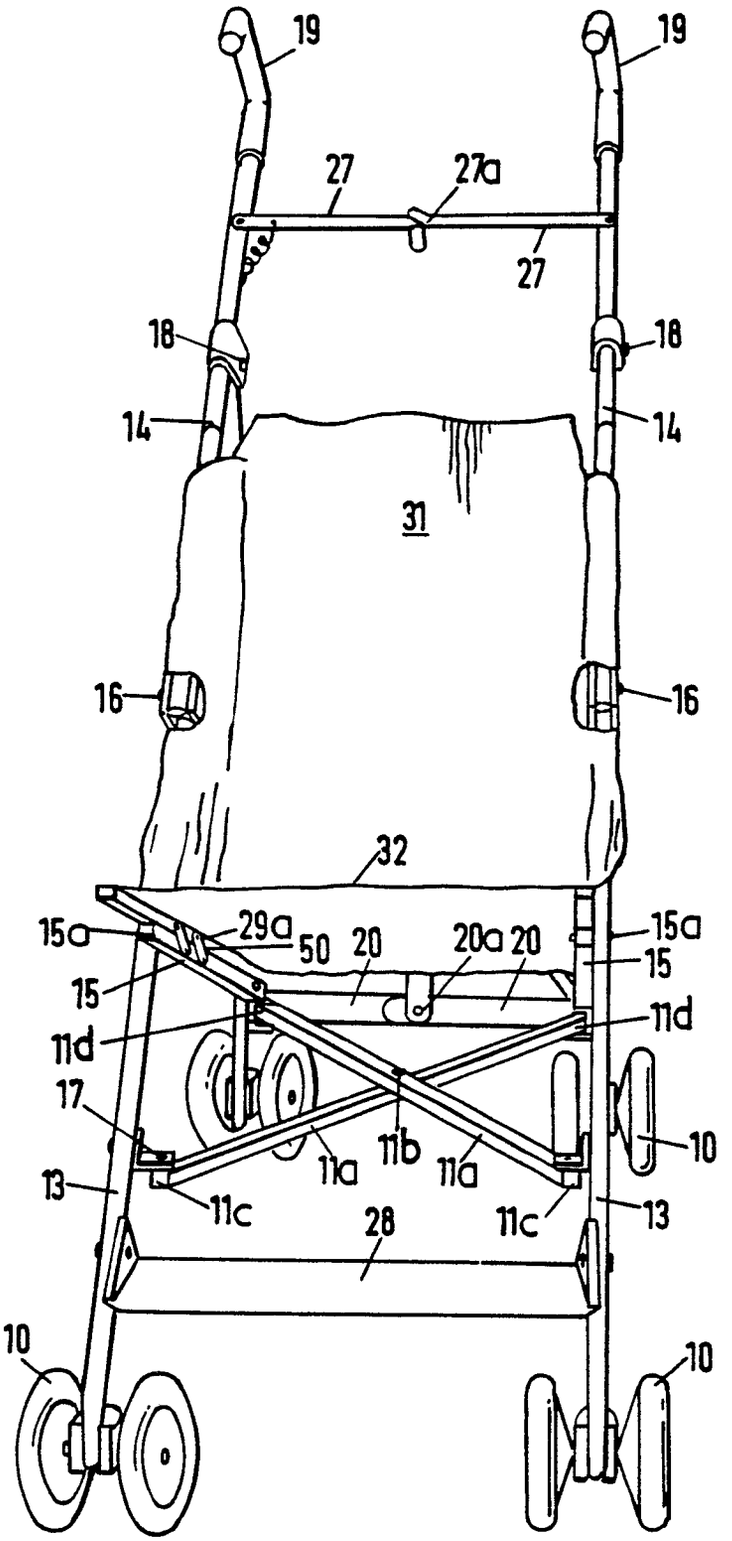
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FIG.3.

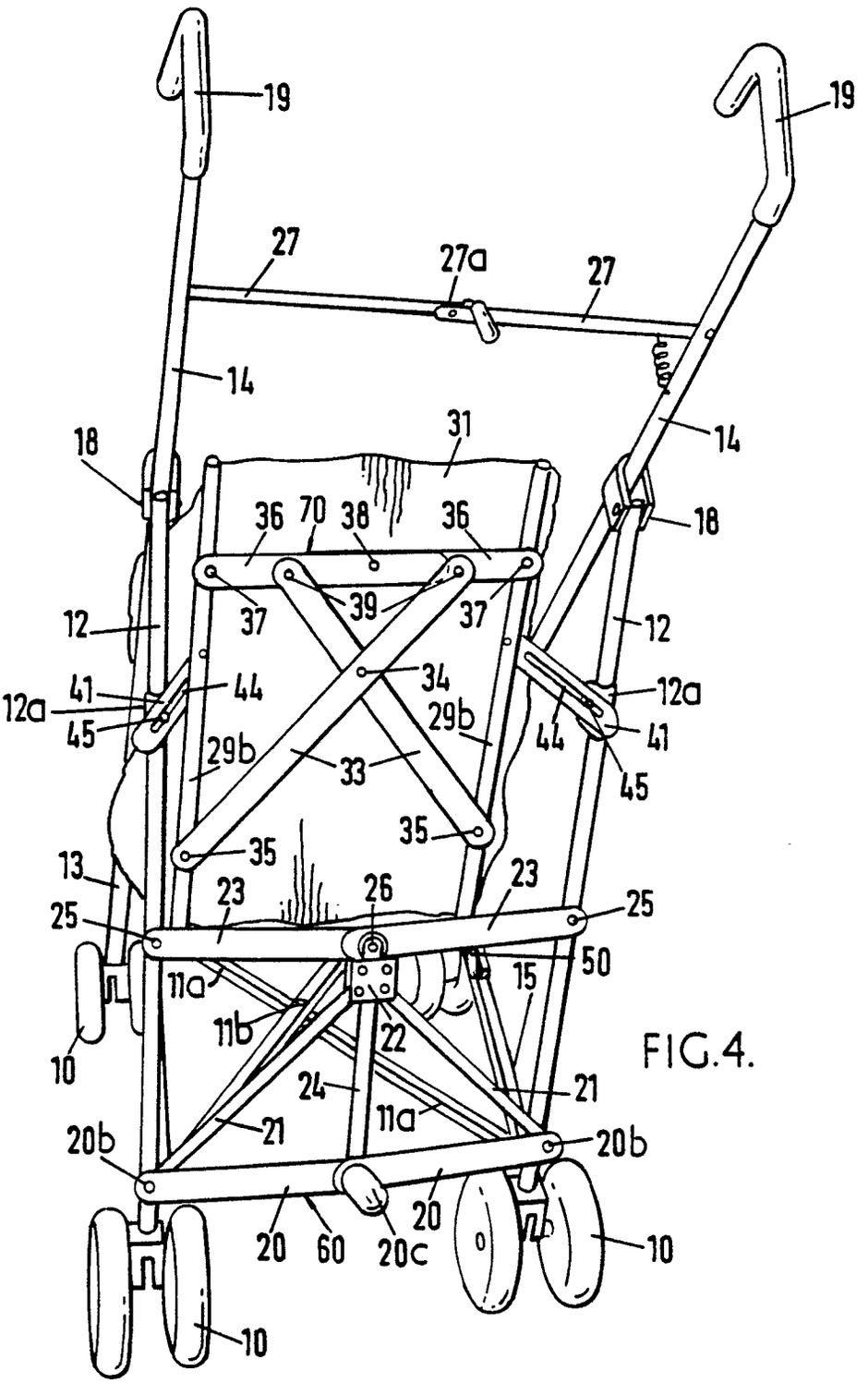
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FIG.4.

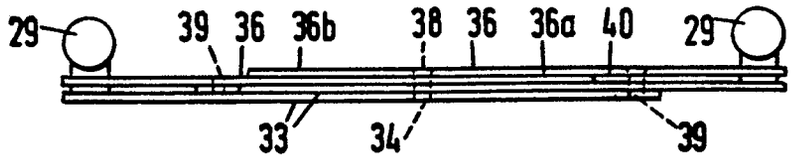
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FIG. 5.

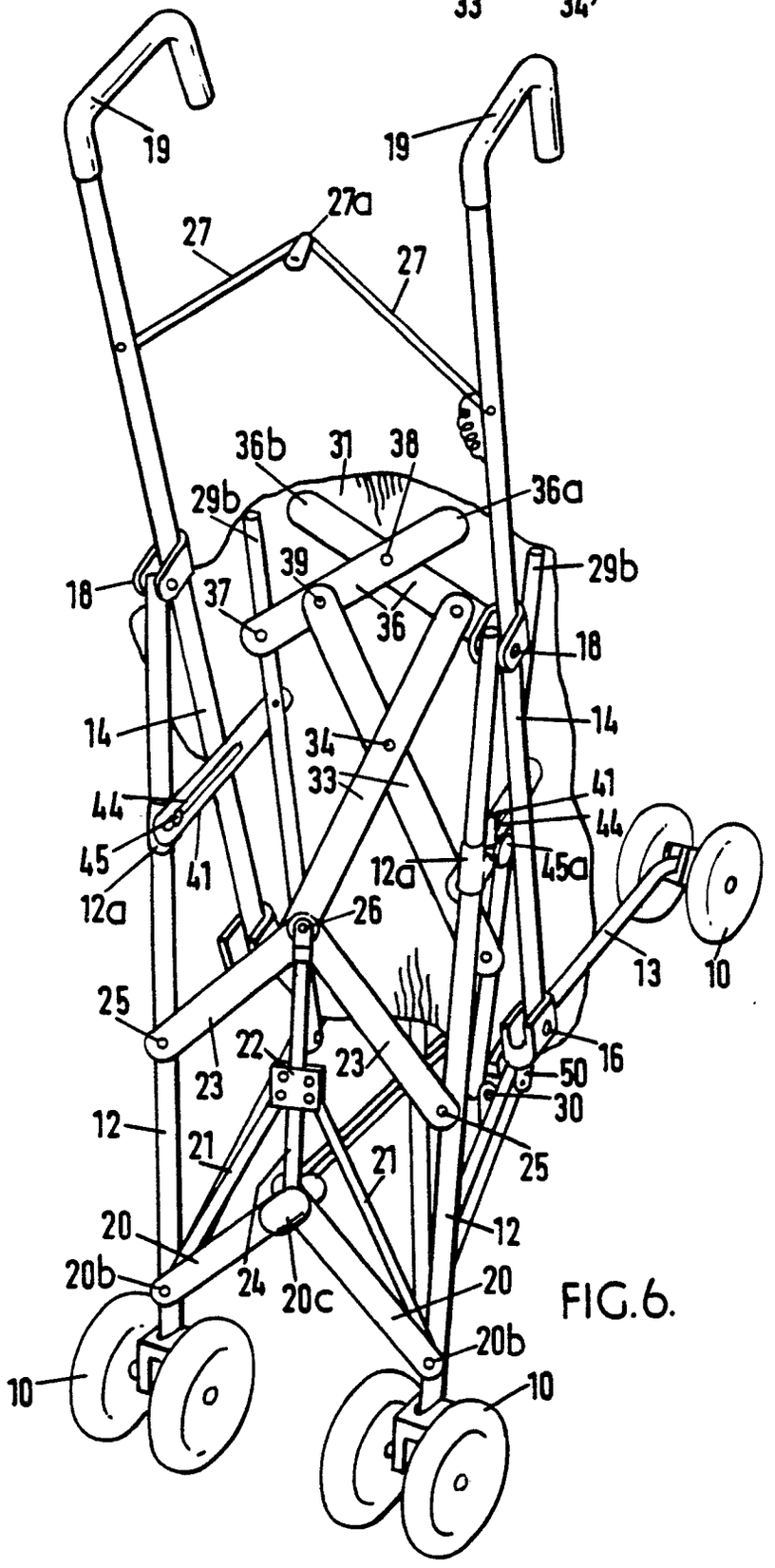
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FIG. 6.

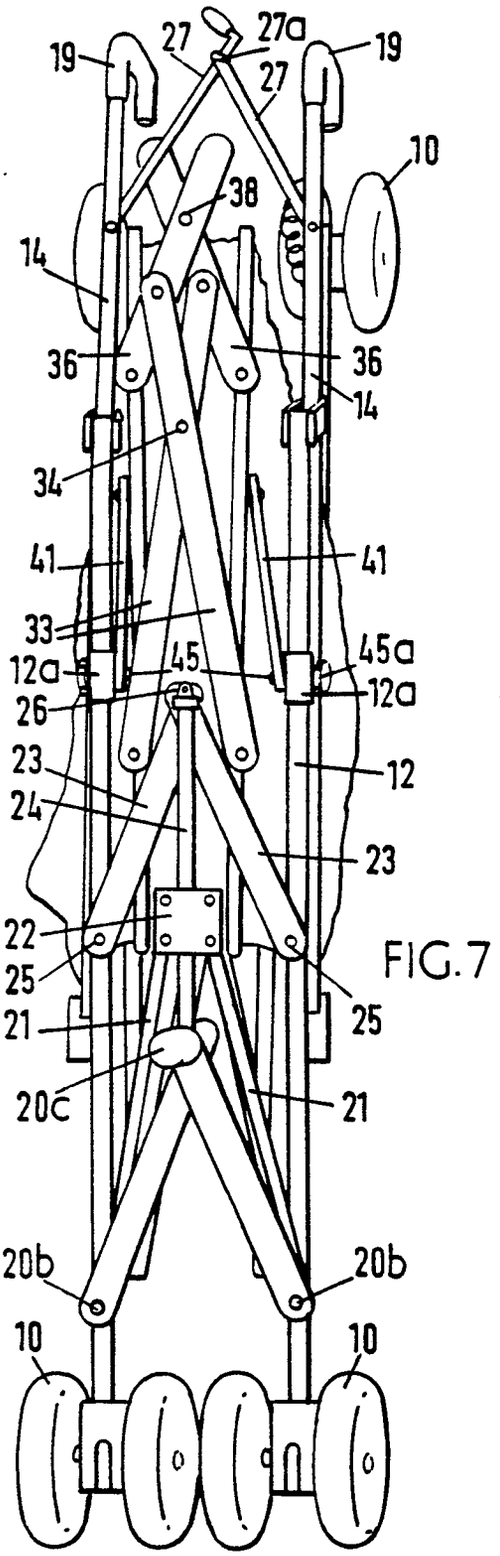
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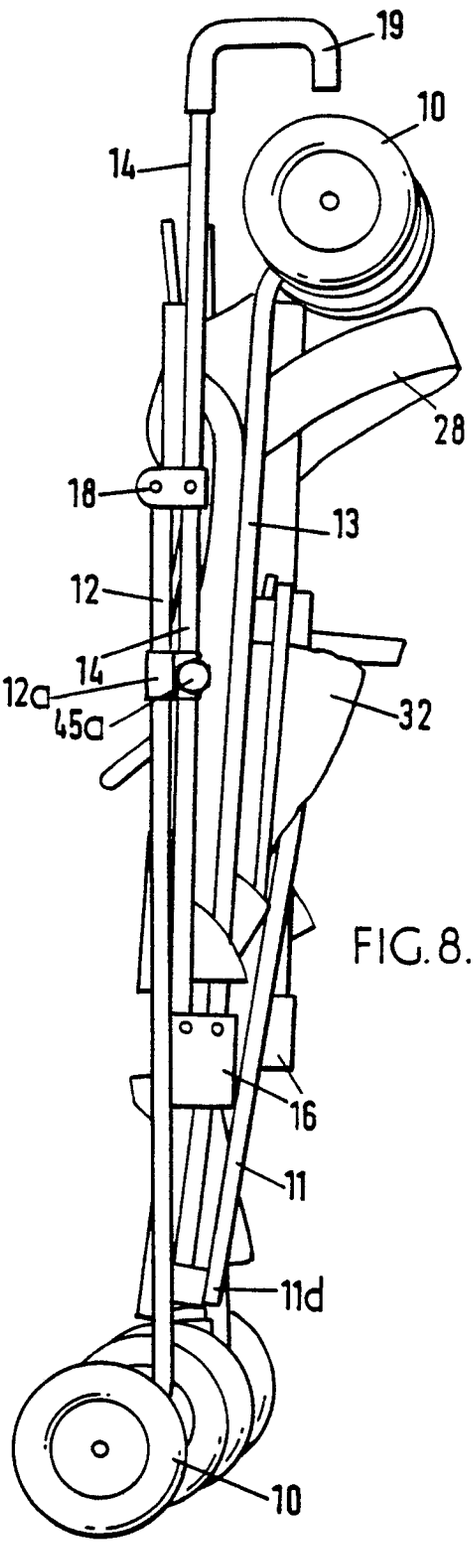
FIG.7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10

FIG.8.

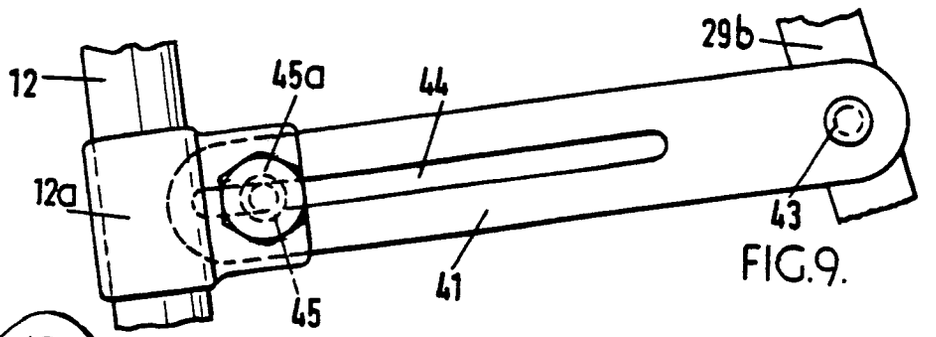
29b
12
45a
44
12a
43
45
41

FIG.9.

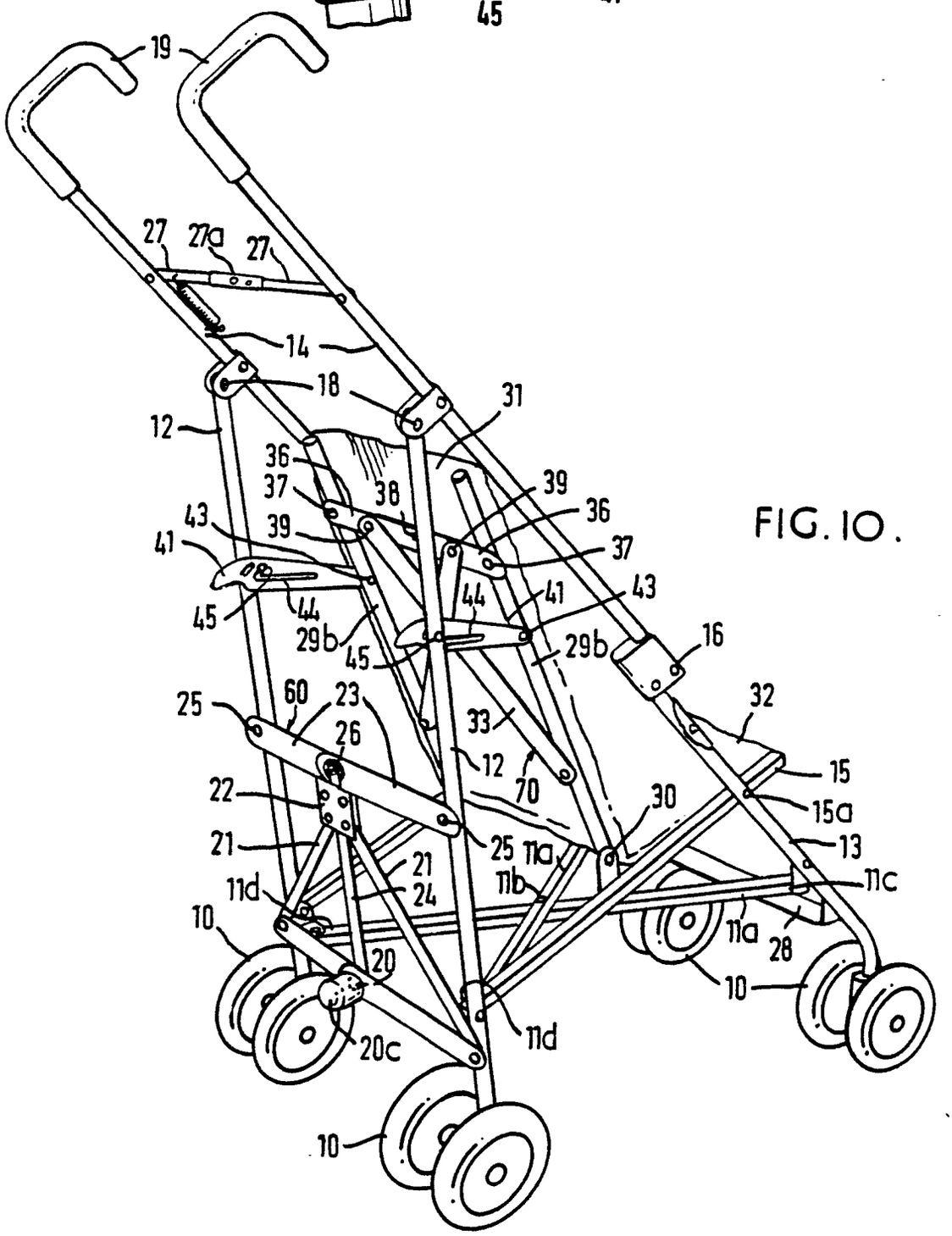
19
27
27a
27
14
18
31
12
36
37
38
39
36
43
39
37
41
41
43
44
44
45
29b
45
29b
16
25
60
23
26
33
32
12
70
15
22
30
15a
21
25
11a
13
21
24
11b
11c
11d
10
20
11a
28
10
20c
11d
10

FIG. 10.

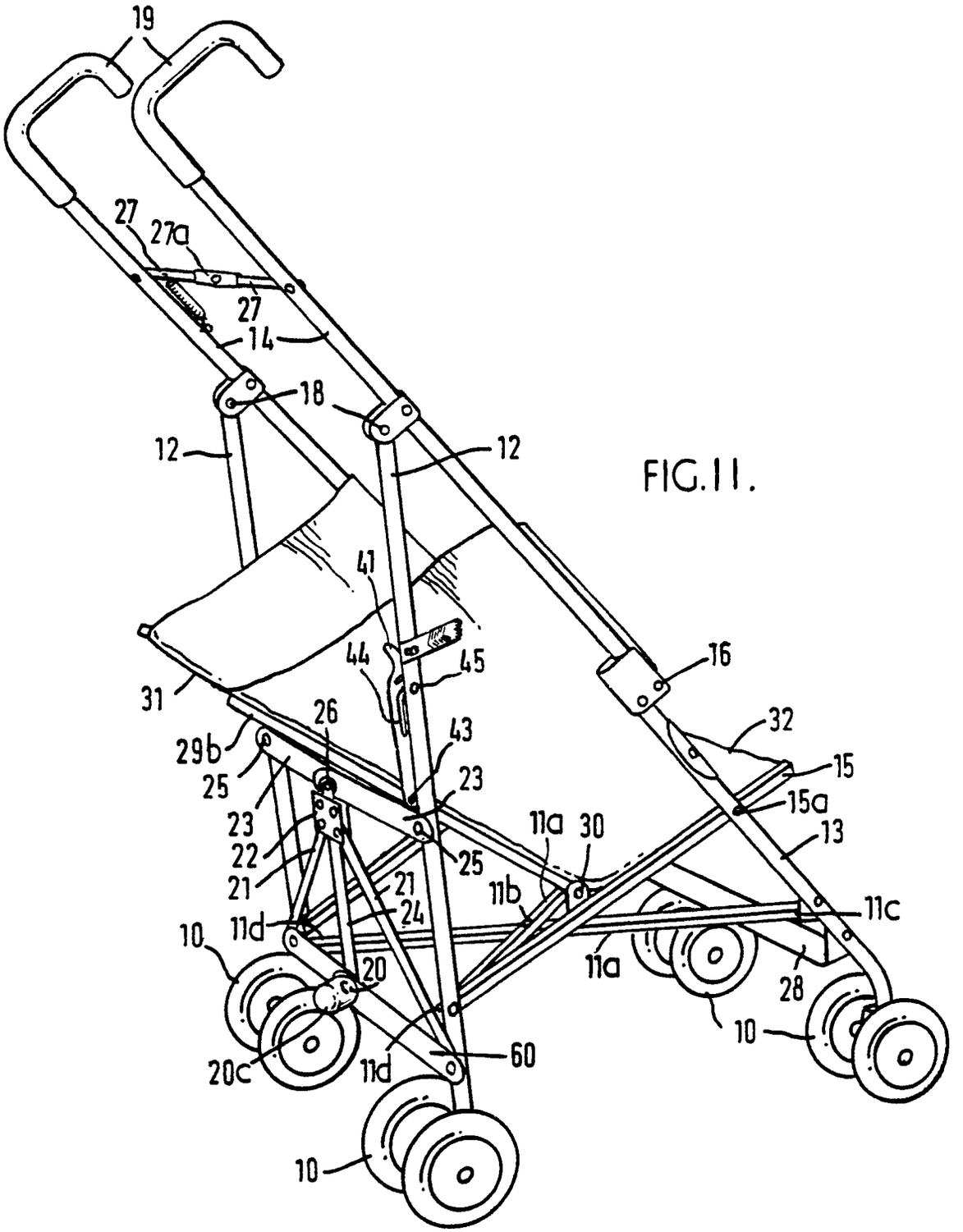
19
27
27a
27
14
18
12
12
41
44
45
16
31
26
43
32
29b
25
23
23
15
15a
23
22
11a
30
13
21
25
21
11b
11c
24
11d
10
20
11a
28
10
20c
11d
60
10

FIG.11.

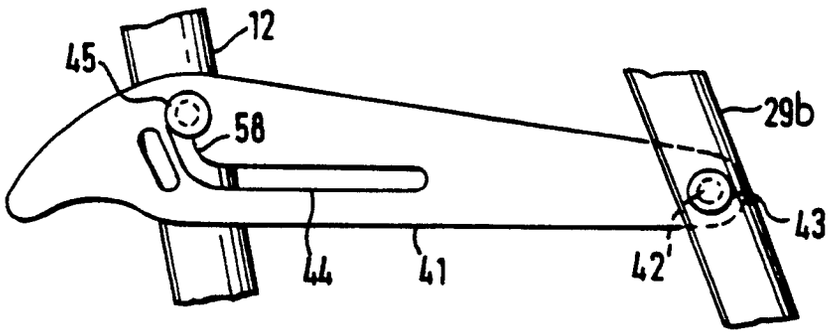
12
45
58
29b
43
44
41
42'

FIG.12.

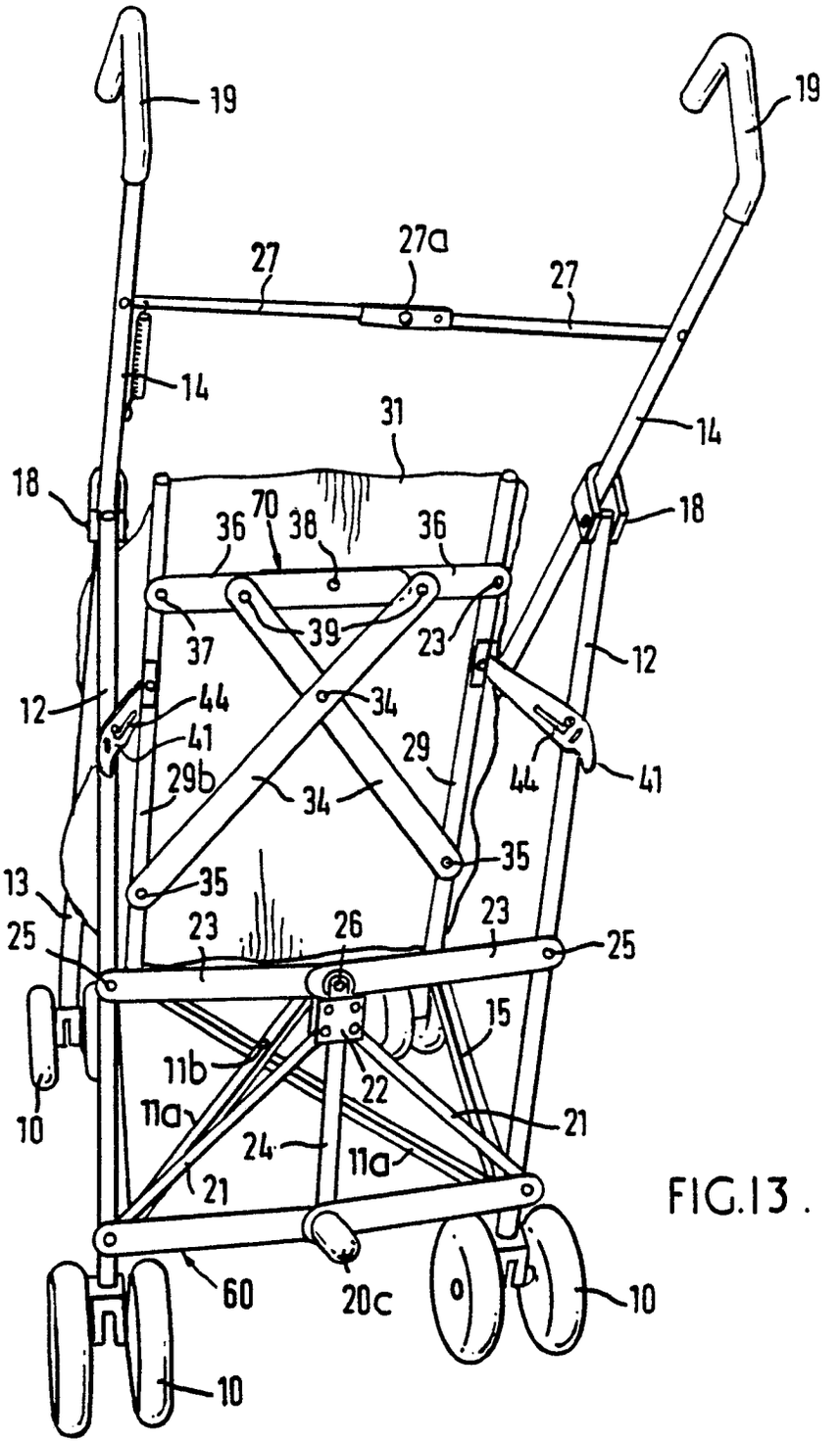
19
19
27
27a
27
14
14
31
18
18
36
70
38
36
37
39
23
12
12
44
34
41
29b
29
44
41
34
35
35
13
25
23
26
23
25
15
11b
22
10
11a
21
24
11a
21
60
20c
10
10

FIG.13.

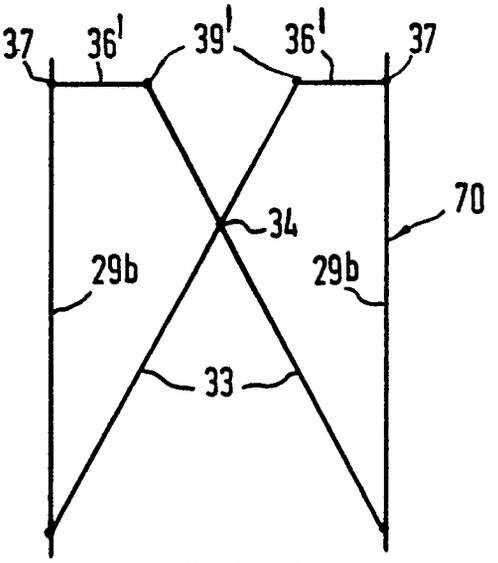

FIG.14

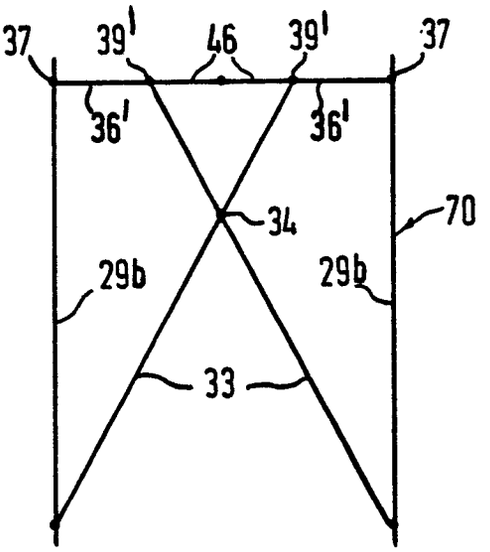

FIG.15 .