United States Patent [19]

Mulder

[11] **3,900,907**

[45] **Aug. 26, 1975**

[54] **BABY CRIB**

[75] Inventor: **Anton J. Mulder,** Downsview, Canada

[73] Assignee: **Mariton Limited,** Toronto, Canada

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[21] Appl. No.: **482,220**

[52] **U.S. Cl.** ..... **5/100;** 5/93; 312/257 SK; 403/376

[51] **Int. Cl.²** **E03D 11/10**

[58] **Field of Search** ..... 312/257 R, 263 SK; 403/230, 231, 263, 376, 408; 5/11, 93, 100

[56] **References Cited**

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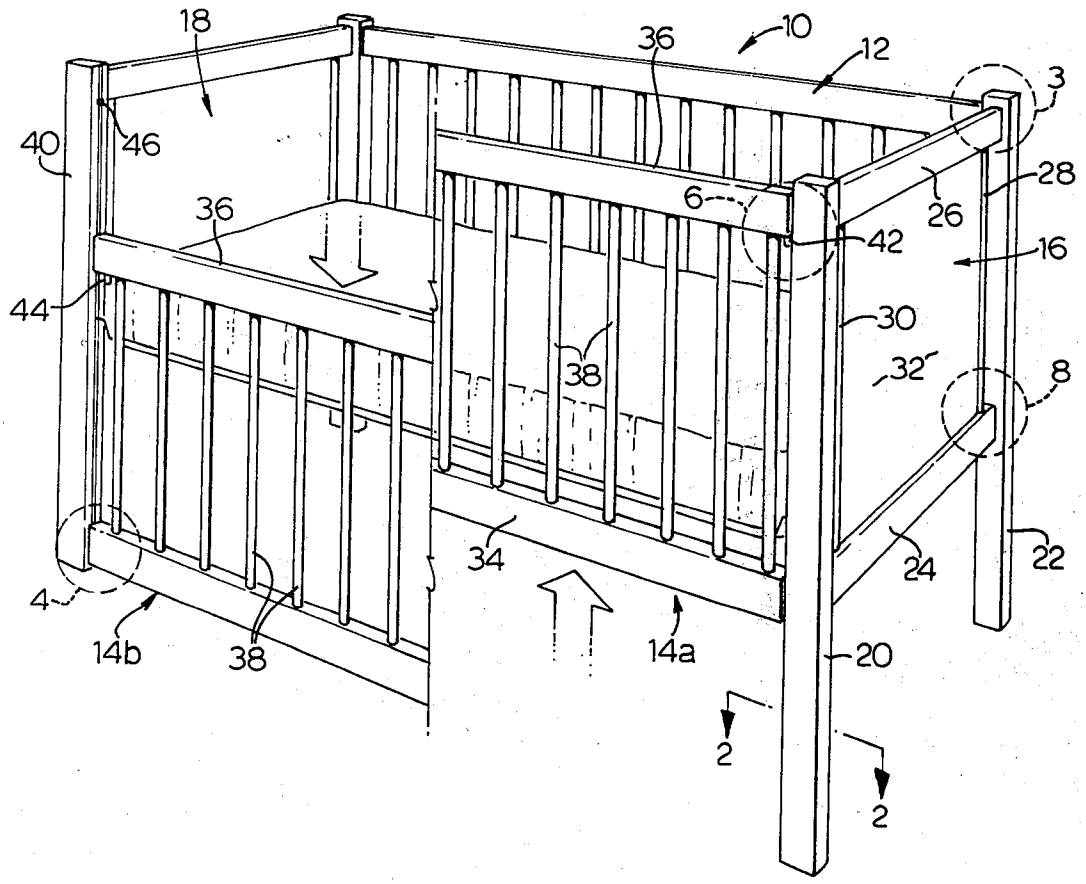
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Primary Examiner—Casmir A. Nunberg

[57] **ABSTRACT**

A plastic baby crib construction having two crib-sides connected to two crib-ends is made of cross-members and upright members having a uniform lateral cross-section. The structural members are hollow, substantially rectangular extrusions having opposing side walls and end walls, four smoothly rounded corners and two partitions extend longitudinally of and are spaced within said hollow extrusion to define three longitudinal channels within said extrusion. A T-shaped member is used to connect the crib-sides to the crib-ends to permit them to slide vertically, the head of the T-shaped member sliding within one of the channels. With this type of construction, no hardware or sharp edges are exposed and the crib may be easily assembled.

9 Claims, 8 Drawing Figures



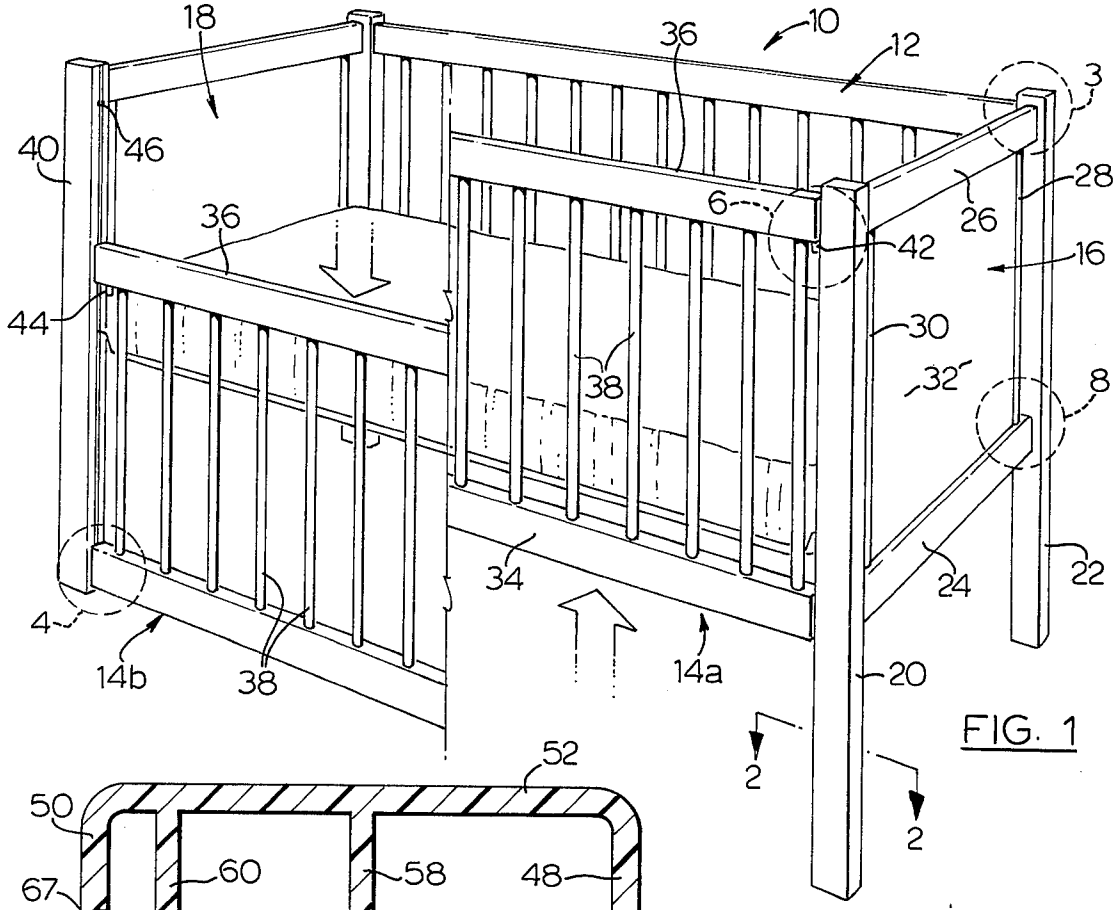


FIG. 1

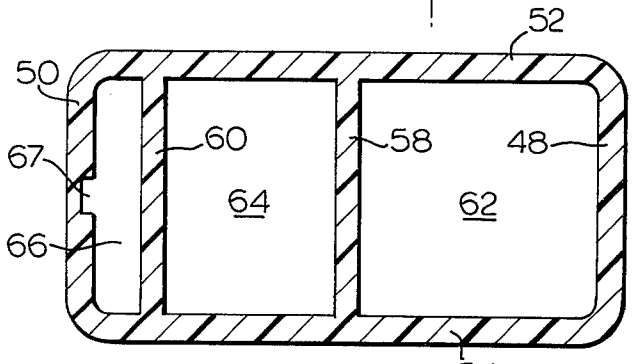


FIG. 2

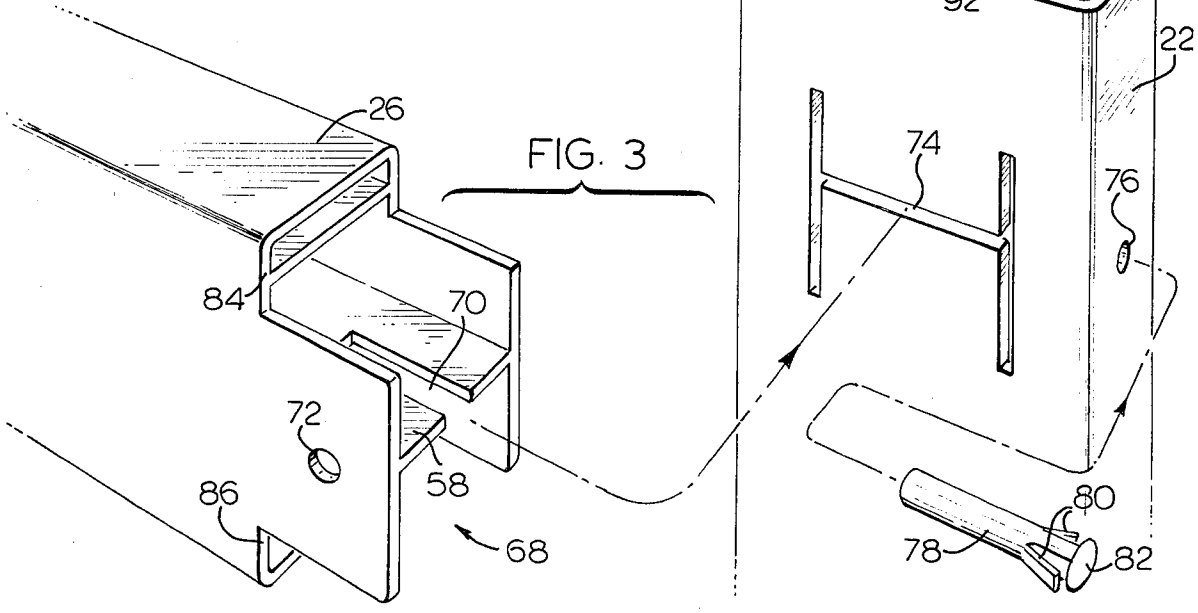


FIG. 3

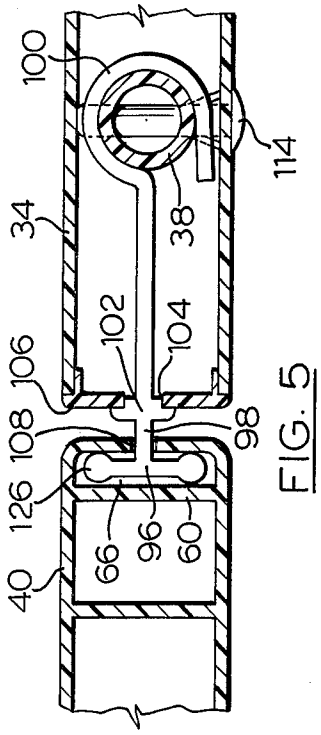

100
114
34
38
102
104
106
108
98
126
66
96
60
40

FIG. 5

112
60
110
110
34
118
38
116
114
120
106
100
94
104
108
98
102
60
96
126
66
50
124
122
40

FIG. 4

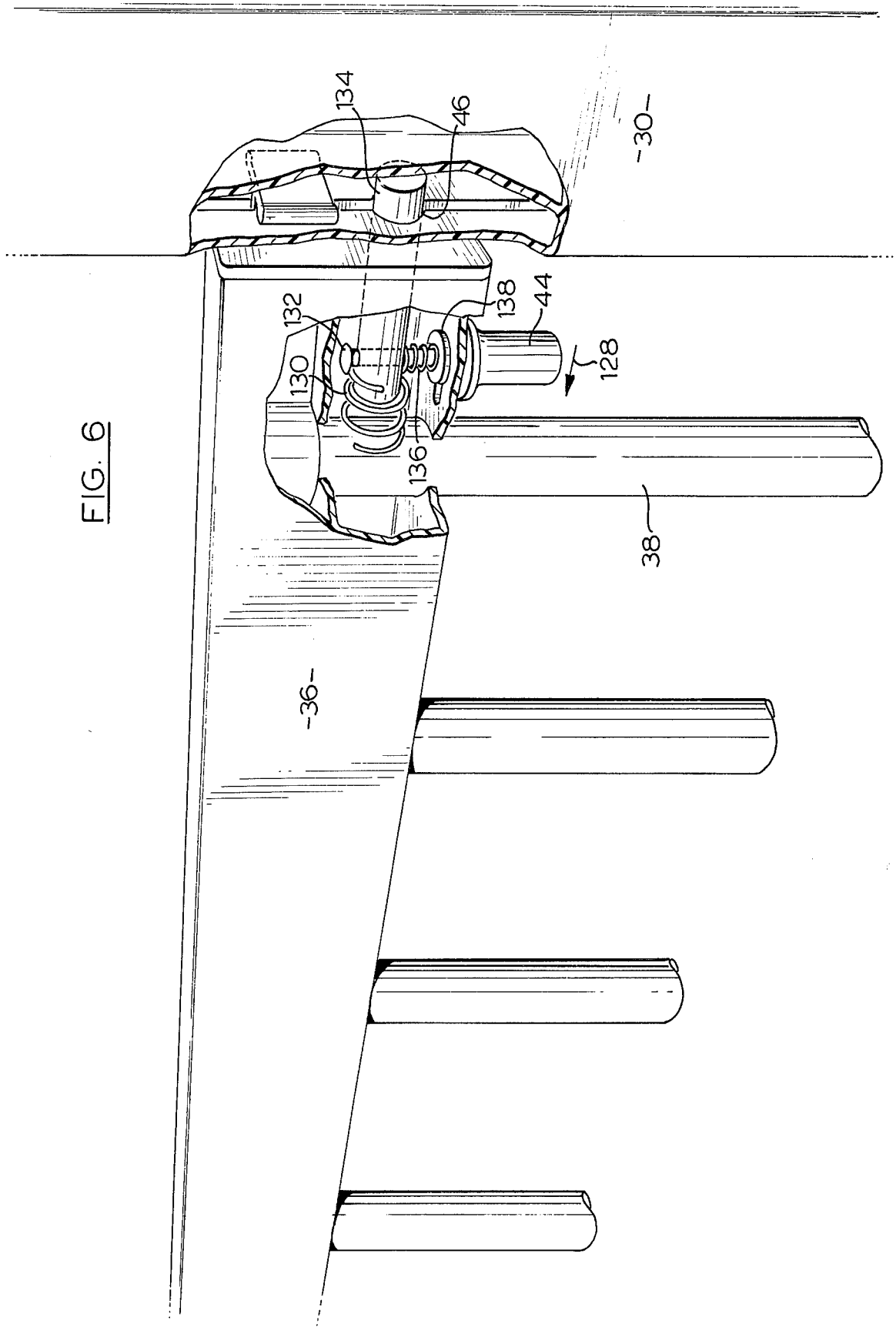


FIG. 6

FIG. 7

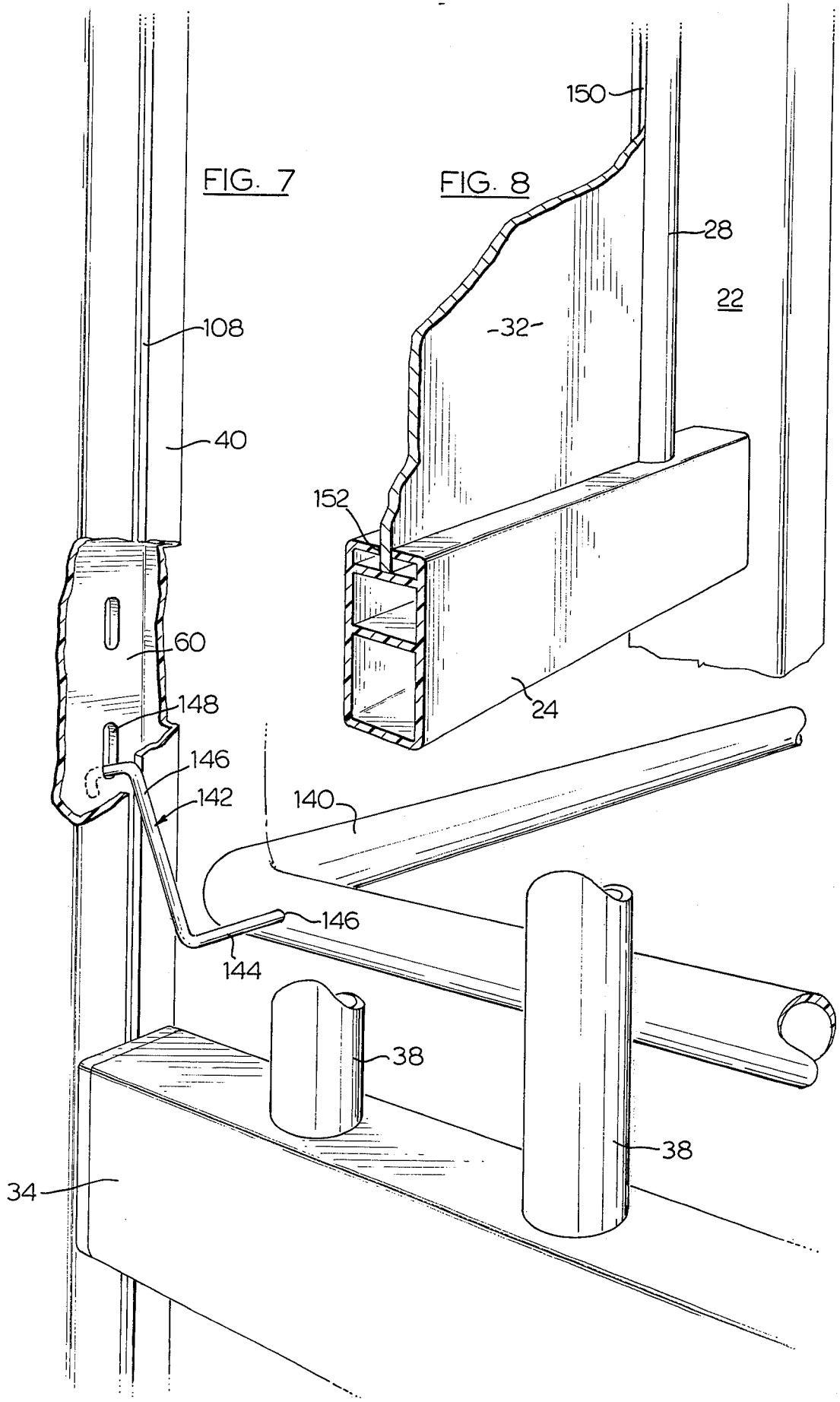


FIG. 8

BABY CRIB

FIELD OF INVENTION

This invention relates to a plastic baby crib construction and, more particularly, to plastic structural members for use in making a plastic baby crib.

BACKGROUND OF THE INVENTION

Most of the cribs which are available on the market are manufactured from wood products and usually require metal brackets and other metal hardware to join the structural members of the wooden crib together to permit raising and lowering of one or more of the crib sides and to support the mattress. These metal parts and portions of the wooden structural members of a wooden crib have sharp corners which can prove to be hazardous to a baby. Wood products require a paint finish of one type or another which can be toxic to a baby when ingested by his chewing on the structural members of the crib. These drawbacks of wooden cribs have been appreciated for some time so that plastic baby crib construction has become a viable solution to the problem, however, most plastic cribs available on the market are formed by injection molding, such as the baby crib described in U.S. Pat. No. **3,634,894**. With plastic injection molded baby cribs, any variation in the crib's dimensions as required by federal government restrictions such as a change in the spacing of the bars in the crib sides or a cosmetic change to the overall design, necessitates scrapping of the costly molds and the machining of new molds, which is very costly because of the extremely high tooling costs. In addition, the capital investment in and the cost of maintaining injection molding apparatus are other important considerations.

With a plastic baby crib construction according to this invention, the problems relating to injection molded plastic and wooden baby cribs have been overcome wherein hardware, rough edges and sharp corners are not exposed. The baby crib according to this invention comprises two crib-sides and two crib-ends where at least one of the crib-sides is movable in a vertical direction relative to the crib-ends. Each crib-end has two parallel spaced-apart uprights and two parallel spaced-apart cross-members disposed horizontally between, and secured to, the uprights. Each crib-side has two parallel spaced-apart cross-members, each end of the crib-side cross-members being adjacent a respective upright of a crib-end. A plurality of evenly spaced apart bars may be disposed between the cross-members of the crib-sides and the crib-ends. Means is provided for engaging each end of the cross-members of at least one of the crib-sides with the respective uprights of the crib-ends to permit the crib-side to move relative to the crib-ends. The improvement in the construction of the baby crib resides in each of the uprights and cross-members of the crib-ends and crib-sides having a uniform lateral cross-section which consists of a hollow substantially rectangular plastic extrusion having opposing side and end walls and four smoothly rounded corners. At least one partition extends longitudinally of and is spaced within, the hollow extrusion of the structural member to define a plurality of longitudinal channels within the extrusion.

The means which is provided to engage each of the ends of the cross-members of at least one of the crib-sides with the respective uprights of the crib-ends to permit the crib-side to move vertically with respect to the crib-ends, may consist of a T-shaped member. The shank of the T-shaped member is attached to each end of the cross-member of the respective crib-side and the shank extends through a slot formed in an end wall of the respective upright of the crib-end. The head of the T-shaped member slides up and down in the elongate or longitudinal channel of the upright where the tolerances of the head portion as it fits within the longitudinal channel of the upright is such that lateral movement of the head of the T within the longitudinal channel is essentially precluded. The baby crib mattress is supported from the uprights of the crib-ends in such a manner that even severe testing procedures will not cause the structural members to fail or permit the crib to collapse with subsequent loss of mattress support.

The cross-members of the crib-sides and crib-ends are bored to form evenly spaced-apart apertures therein of diameter or cross-section substantially equal to the diameter or cross-section of the bars used in the crib where the bars are press-fitted into the crib-sides and crib-ends. Changes in federal government restrictions on the bar spacing and changes to the over-all design may be therefore easily accommodated by such a crib construction at a minimum cost as compared to the cost involved in having to re-tool for changes in injection molding apparatus.

SUMMARY OF THE INVENTION

It is therefore an object of the invention to provide a structural member for a plastic baby crib construction which may be extruded in continuous lengths and which permits the manufacture of a plastic baby crib at relatively low cost.

It is another object of the invention to provide a crib construction which may be easily adapted to comply with federal government restrictions concerning variations in bar spacing and rigidity of construction.

It is a further object of the invention to provide a plastic baby crib construction which is not hazardous to the baby where any hardware used is not exposed.

It is yet another object of the invention to provide means for attaching the crib-sides to the crib-ends where at least one crib-side is permitted to move vertically with respect to the crib-ends, yet provide a crib which is durable and is adapted to withstand abuse.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects, features and advantages of the invention are discussed in more detail hereinafter in association with the accompanying drawings in which:

FIG. **1** is a perspective view of the baby crib according to this invention wherein a crib-side is sectioned and shown in both raised and lowered positions.

FIG. **2** is a cross-section of an upright of a crib-end as taken along the lines **2—2** in FIG. **1.**

FIG. **3** is an exploded view of the intersection of a cross-member and upright of a crib-side shown in area **3** of FIG. **1.**

FIG. **4** is an exploded view of the intersection of a cross-member of a crib-side with an upright of a crib-end as shown in area **4** of FIG. **1.**

FIG. **5** is a partial sectioned view of a cross-member of a crib-side being attached to an upright of a crib-end.

FIG. 6 is a partial sectioned view of the childproof locking mechanism shown in area 6 of FIG. 1.

FIG. 7 is a partially sectioned view of a crib-side and upright of crib-end wherein the structure of the mattress hanger is shown.

FIG. 8 is a sectioned view of area 8 shown in FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In FIG. 1 of the drawings the baby crib 10 is shown as having crib-sides 12 and 14 and crib-ends 16 and 18. Crib-side 14 is movable in a vertical direction with respect to the crib-ends 16 and 18 where the crib-side 14 is sectioned to show it in its upper position 14A and its lower position 14B.

Crib-end 16 is identical to crib-end 18 where crib-end 16 comprises uprights 20 and 22 and cross-members 24 and 26. The cross-members 24 and 26 are disposed horizontally between and secured to, the uprights 20 and 22. Crib-end 16 has spaced, between cross-members 24 and 26, two vertical bars 28 and 30 which have longitudinal slots to accommodate a solid end panel 32.

Crib-side 12 is substantially identical to crib-side 14, however, crib-side 12 may or may not be movable in a vertical direction with respect to the crib-side, this of course, being optional depending upon design requirements. Crib-side 14 comprises cross-members 34 and 36 where a plurality of evenly spaced-apart bars 38 are vertically disposed between cross-members 34 and 36. Each end of the cross-members 34 and 36 are adjacent the respective diametrically opposed uprights 20 and 40 of crib-sides 16 and 18 respectively. A T-shaped member is used to engage the ends of cross-members 34 and 36 with the uprights 20 and 40. The T-shaped member will be discussed in more detail hereinafter with respect to FIGS. 4 and 5 of the drawings. The purpose of the T-shaped member is to permit the crib-side 14 to slide vertically to positions 14A or 14B with respect to the crib-side where wobble of the crib-ends during movement of the crib-sides is substantially reduced.

To retain the crib-side 14 in one of the desired elevated positions, two independent release buttons 42 and 44 are provided which engage apertures 46 provided in diametrically opposed uprights 20 and 40 where the button in released position projects into recesses 46 which are appropriately positioned to retain side 14 at the desired elevation. When side 14 is in position B the side is permitted to drop practically to the floor where cross member 34 either contacts the floor or the T-shaped engaging members interact with the lower castor systems of uprights 20 and 40.

The cross-members of the crib-ends and sides and the uprights of the crib-ends all have a uniform lateral cross-section as shown in FIG. 2. The cross-section consists of a substantially rectangular hollow extrusion having opposing end walls 48 and 50 and opposing side walls 52 and 54. The side walls intersect the end walls to form smoothly rounded corners 56 and two partitions 58 and 60 extend longitudinally of the extrusion to form three longitudinal channels, 62, 64 and 66. Partition 58 contributes to the rigidity of the structural member and also assists in retaining the vertical bars of the crib-sides and ends in press-fitted anchored position. In order to permit the joining of the crib-sides to the crib-ends and the sliding of the crib-side with respect to the crib-ends, partition 60 is spaced from end wall 50 so that channel 66 is elongated thereby accommodating the head of the connecting T-shaped member which is discussed in more detail with respect to FIGS. 4 and 5. However, it is understood that partition 66 is not necessary, if an alternate sliding mechanism is used. An alternate mechanism may be a tongue and groove arrangement where a triangle-shaped tongue could be provided with the apex thereof affixed to or integrally molded to the outside of end wall 50 and a correspondingly shaped groove provided on the ends of the cross-members 34 and 36 of crib-side 14 to engage the tongue and permit vertical movement of the crib-side 14.

FIG. 3 shows the manner in which cross-member 26 may be connected to upright 22 to ensure that the joint between the two members is secure so as to preclude transverse rocking or wobbling of the crib-end. The end of cross-member 26 has been machined to form a rectangular tongue portion 68. A slot 70 is formed in partition 58 and an aperture 72 is formed in the outer side of the cross-member 26. Where the cross-member 26 intersects the upright 22, an aperture having the configuration of an H and dimensions identical to the face of tongue 68 is machined in the inner side of upright 22. Slot 70 which is formed in partition 58 accommodates the same partition in upright 22 when the tongue 68 is inserted into the aperture 74. An aperture 76 is formed in the outside end wall of upright 22 and is aligned with aperture 72 of tongue 68. A nylon pin 78 is inserted through apertures 76 and 72 to secure cross-member 26 to upright 22 where pin 78 has resilient retaining flaps 80 which compress inwardly as the pin 78 is driven home by a mallet. The distance betwen the tips of flaps 80 and the inside surface of the head 82 of pin 78 is substantially equal to the thickness of the end wall of the upright 22 so that when the pin 78 is driven home, the resilient flaps 80 spring outwardly to bear against the inside surface of the end wall and preclude removal of pin 78. Pin 78 may be made from any suitable resilient plastic material such as nylon.

In order to ensure that cross-member 26 does not pivot about pin 78 after tongue 68 is secured within upright 22, the positioning of apertures 72 and 76 is such that the surfaces defined by the machined faces 84 and 86 of the end of cross-member 26 is such that faces 84 and 86 are held tightly against the inner surface of upright 22. As a result, any transverse force applied to the crib-end 16 which would attempt to rotate cross-member 26 about pin 78 is resisted by the interference of faces 84 and 86 with the areas of the inner surface of upright 22 above and below aperture 74.

A cap 88 with rounded and smooth corners 90 is secured in the open end of upright 22 to form the finished product. Tabs 92 of cap 88 are resilient in an outward direction and are sloped outwardly so as to retain cap 88 in the open end of upright 22. Glue may be applied to flaps 92 to ensure that the cap 88 is not removed therefrom.

The lower portion of upright 40 and corresponding cross-member 34 are shown in FIG. 4. The T-shaped member 94 referred to hereinabove consists of a head portion 96, a shank portion 98 and a curved looped portion 100. A flange 102 is provided to position the shank 98 in slot 104 of end cap 106. The inner end wall of upright 40 has a slot 108 formed therein where the end wall chosen in which the slot is formed is the end

wall closest to a partition. The head of the T-shaped member **94** is placed in the elongate channel **66** and the shank **98** extends out through slot **108.** Bar **38** is forced through aperture **110** which is formed in an end wall of cross-member **34** and as can be seen from the sectioned end of member **34,** an aperture **112** is formed in the central partition **58** so that bar **38** can be forced down to extend through looped portion **100** and contact partition **60.** A nylon pin **114** extends through aperture **116** and is aligned with aperture **118** in bar **38** so as to ensure that bar **38** is secured within cross-member **34.** Pins **114** may be used as a safety device at each end of a crib-side at both top and bottom of the outermost bar **38** to ensure that cross-members **34** and **36** do no separate, although the bars are press-fitted into the cross-members by several thousand pounds pressure so that the likelihood of separation without the use of pins is minimal.

End cap **106** has resilient flaps **120** and fits in the open end of cross-member **34.** The length of shank **98** is such to ensure that end cap **106** is firmly held in the open end of member **34** by flange **102** where the shank **98** is held in place by bar **38** extending through looped portion **100.** The corners and edges of end cap **106** are smoothly rounded.

A base or castor end cap **122** for the lower open end of upright **40** is provided. Resilient flaps **124** serve to hold the base end cap in position. Glue may be applied to flaps **124** to prevent removal of bottom cap **122** from the open end of upright **40.** Castor stems or the like may be fastened to end cap **122** in accordance with standard practice.

With reference to FIG. **5** of the drawings, a partially sectioned view of the assembled arrangement of FIG. **4** shows the relationship of the T-shaped member with respect to joining upright **40** to cross-member **34.** Head **96** of the T-shaped member has beads **126** which are of a width almost equal to the width of the elongate channel **66,** there being some tolerance to permit free sliding of the head **96** within the elongate channel **66.** However, the tolerance is kept to a minimum to preclude extensive lateral movement of the head in channel **66,** to overcome the problem of the crib-ends wobbling and the crib-side "chattering" when the crib-side is raised and lowered.

Looped portion **100** of the T-shaped member **94** has an inner circumferential dimension substantially equal to that of bar **38** so as to ensure a snug and secure fit between the two members and to preclude movement of shank **98** in an outward direction when a transverse force is applied to the crib-side. As is shown in FIG. **5,** pin **114** does not interfere with looped portion **100** of the T-shaped member **94** although alternative arrangements may be made whereby the pin may extend through looped portion **100.** In addition to flange portion **102** of the T-shaped member **94** precluding movement of the end cap **106,** the flange portion **102** which is in register with and snugly fits in slot **104** precludes movement of shank **98** in either a vertical or lateral direction when the cross-member **34** is moved with respect to the upright **40.**

As discussed hereinabove, button **44** is operative in association with recesses **46** to retain the crib-side **14** in any desired elevation. The button **44** is movable in the direction of arrow **128** where a spring **130** positively urges button **44** in a direction opposite to that of arrow **128.** Pin **132** traps spring **130** between bar **38** as it encircles bolt **134.** In order to permit a degree of vertical movement of bolt **134,** an additional spring **136** encircles pin **132** and is trapped between bolt **134** and washer **138.** One or more apertures **46** are formed in the respective end wall and adjacent partition of the crib-end upright where the positioning of the apertures **46** are at the same elevation in diametrically opposed uprights.

FIG. **7** shows the manner in which the mattress support tubing **140** is suspended within the framework of the baby crib. The position of cross-member **34** when it is in its uppermost position is below the location of the mattress hanger **142.** The mattress hanger **142** is formed from metal rod having high tensile strength. It has a lower leg portion **144** which extends through an aperture **146** in tubular frame **140.** Lower leg **144** turns into an upper hook portion **146** which extends through slot **108** and rests in one of the apertures **148** formed in partition **60.** More than one aperture **148** is formed in partition **60** to permit adjustment of the height of mattress support **140.**

FIG. **8** shows a portion of crib-end **16** and the manner in which panel **32** is mounted in crib-end **16** between cross-member **24** and **26.** Panel **32** may be transparent or opaque material and of a dimension to fit between bars **30** and **28** and cross-members **24** and **26** where bar **28** has a longitudinal slot to accommodate the vertical edge of panel **32.** In addition, cross-member **24** has a longitudinal slot **152** between bars **28** and **30** to accommodate the lower horizontal edge of panel **32.** End panel **32** is therefore secured in the crib-end **16** without the use of any hardware or the like.

It is therefore apparent from the detailed description of the preferred embodiments that the cross-section of the structural member shown in FIG. **2** permits the construction of a crib which is rigid, yet is easy to assemble and requires a minimum number of different parts. It is understood that the panels such as **32** in crib-end **16** are optional in that other than the use of panels, bars may be substituted therefor and placed therein in a fashion similar to which they are positioned in crib-sides **12** and **14.** As a result, with essentially two basic structural components for the crib, i.e.: the members of cross-section shown in FIG. **2** and the bars, the cost of manufacturing such a crib is substantially reduced as compared to the process of injection molding of crib-sides and ends.

Plastics used in continuously extruding the structural members of the baby crib may be rigid polyvinyl chloride having a built-in fire retardant. The end panels may be formed from clear acrylic or high impact polystyrene, and the T-shaped members may be formed from any suitable self-lubricating plastic such as nylon. The end caps may be formed by injection molding rigid polyvinyl chloride. It is important to note that all of the structural members are formed so that the edges are smoothly rounded to substantially reduce hazard to the baby if it happens to fall against the crib-sides or ends. The plastic raw materials are chosen to ensure that they are non-toxic.

As federal government regulations on the structure and quality of cribs becomes more strict, or other changes to design are required, the construction of this baby crib easily lends itself to adaptation. A further feature of this baby crib is that it will withstand even the strictest of vibration tests. A **60**-pound weight was dropped **500** times from a height of **6** inches at 1-

second intervals. After the test was completed, the frame showed no signs of collapsing nor had the mattress hangers, shown in FIG. 7, separated from the mattress support.

While various preferred embodiments of the invention have been illustrated and described, it will be understood that variations therein may be made as will be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In an improved baby-crib construction comprising two crib-sides and two crib-ends, at least one of said crib-sides being movable in a vertical direction relative to said crib-ends; each crib-end having two parallel spaced-apart uprights and two parallel spaced-apart cross-members disposed horizontally between and secured to said uprights; each crib-side having two parallel spaced-apart cross-members, each end of said crib-side cross-member being adjacent a respective upright of a crib-end; and means being provided for engaging each end of the cross-members of at least one of said crib-sides with the respective uprights of said crib-ends which is adapted to permit said crib-side to move relative to said crib-ends; the improvement comprising each said uprights and said cross-members of said crib-ends and crib-sides having a uniform lateral cross-section and consisting of a hollow, substantially rectangular extrusion having opposing side and end walls and four smoothly rounded corners and at least one partition extending longitudinally of and being spaced within said hollow extrusion to define a plurality of longitudinally extending channels within said extrusion.

2. In a baby-crib of claim 1, said extrusion having first and second partitions, said first partition spanning said opposing side walls and said second partition being disposed proximate an end-wall of said extrusion to define an elongate channel; where the end wall adjacent the second partition of diametrically opposed uprights of said crib-ends is provided with a longitudinal slot along at least a portion of the length of said end wall; said means for engaging each end of the crib-side cross-members with the respective upright comprising a T-shaped member provided at each end of the cross-members of the respective crib-side, the head portion of said T-shaped member being adapted to slide vertically within said elongate channel, the shank of said T-shaped member being adapted to extend outwardly through said slot and secured to the end of the respective cross-member of said crib-side; said T-shaped member engaging each end of the crib-side cross-members with the respective diametrically opposed uprights of said crib-ends thereby to permit vertical movement of said crib-side relative to said crib-ends.

3. In a baby-crib of claim 2, said head and shank of said T-shaped member being an integral molded piece of plastic, the width of said head being substantially greater than the width of said slot and less than the distance between the opposing side walls of said extrusion; said head being adapted to slide freely within said elongate channel; the width of said shank being less than the width of said slot where said shank is positioned on said head to be in register with said slot and extend therethrough.

4. In a baby-crib of claim 1, a plurality of parallel bars being vertically spaced between said cross-members of each crib-side; each of said bars being substantially uniform in length and diameter; a plurality of spaced-apart circular apertures being formed in an end wall and at least one of said partitions of each of said cross-members of each crib-side, the apertures in an end-wall of one cross-member being vertically aligned with the apertures in an end-wall of the other cross-member of a crib-side; said apertures being of a diameter which permits a press-fit insertion of a bar therein whereby said plurality of bars are spaced between and secured to the cross-members of a crib-side.

5. In a baby-crib of claim 4, said partitions in said extrusion being first and second substantially parallel webs spanning said opposing side walls thereof, said second web being disposed adjacent and parallel to one of said end walls of said extrusion, an elongate channel being defined between said second web and said end wall; where the end wall adjacent the second web of diametrically opposed uprights of said crib-ends is provided with a longitudinal slot along at least a portion of the length of said end wall; said means comprising a T-shaped member provided at each end of the cross-members of the respective crib-sides, the head portion of said T-shaped member being adapted to slide vertically within said elongate channel, the shank of said T-shaped member being adapted to extend outwardly through said slot and being firmly connected to the end of the respective cross-member of said crib-side; said T-shaped member slidably engaging each end of the cross-member of a crib-side with the respective diametrically opposed uprights of said crib-end thereby to permit vertical movement of said crib-side relative to said crib-ends.

6. In a baby-crib of claim 5, said shank of said T-shaped member extending longitudinally into at least one of said channels of a cross-member end of a crib-side; said shank being provided with means for encircling at least in part a bar closest to said cross-member end which passes through said apertures formed in said end-wall and web of said cross-member.

7. In a baby-crib of claim 6, an end cap being provided on each cross-member end of said crib-sides; each end-cap being provided with an aperture to permit the shank of said T-shaped member to extend therethrough.

8. In a baby-crib of claim 7, said shank having flange means for securely positioning said shank in said aperture of said end-cap to preclude lateral or vertical movement of said shank relative to the respective cross-member of a crib-side.

9. A continuous lightweight extrusion of uniform lateral cross-section for use as structural members in a baby crib construction comprising a hollow substantially rectangular member having opposing side and end walls and four smoothly rounded corners, at least one partition extending longitudinally of, and being spaced within said hollow extrusion to define a plurality of longitudinally extending channels within said extrusion; whereby said continuous extrusion is cut into lengths to provide uprights and cross-members for the crib-sides and crib-ends, said cross-members which retain bars for the crib-sides and crib-ends being provided with apertures in an end wall and at least one partition thereof, the diameter of said apertures being such that said bars are press-fitted therein to secure said bars between the respective cross-members.

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