Aug. 5, 1969 J. R. MEADE 3,459,423

TORSION BAR SWING CONSTRUCTION

Filed June 14, 1963 2 Sheets-Sheet 1

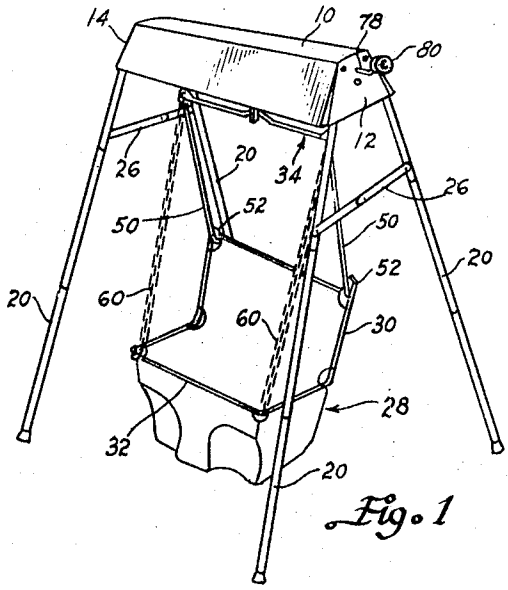


Fig. 1

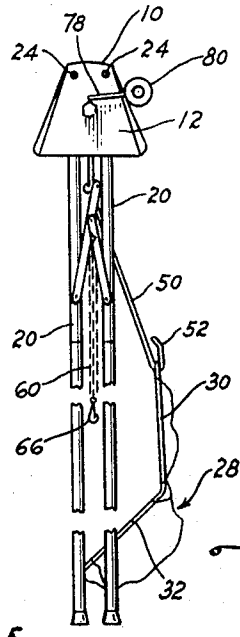


Fig. 2

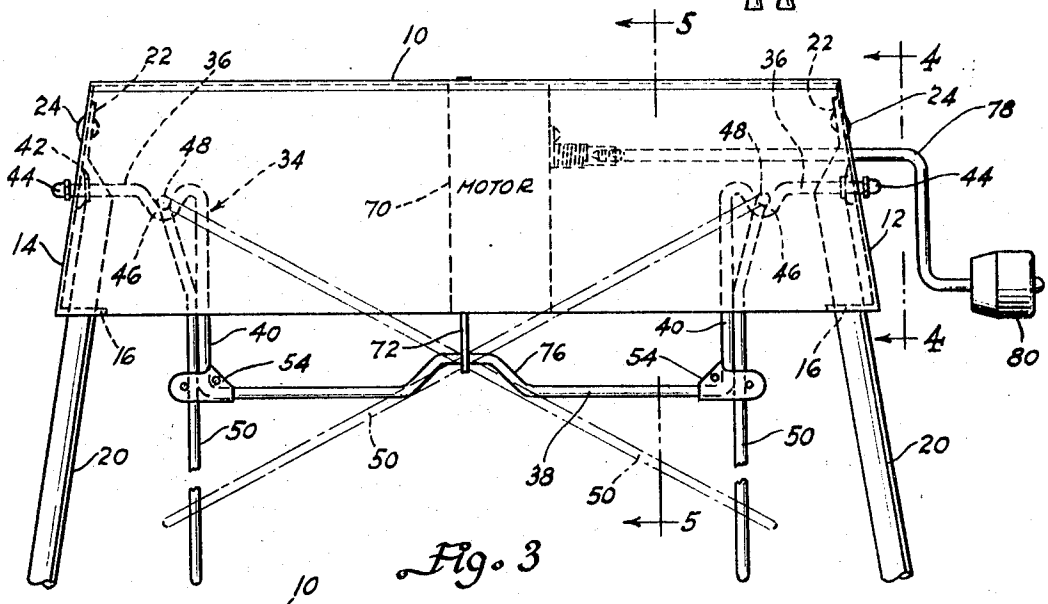


Fig. 3

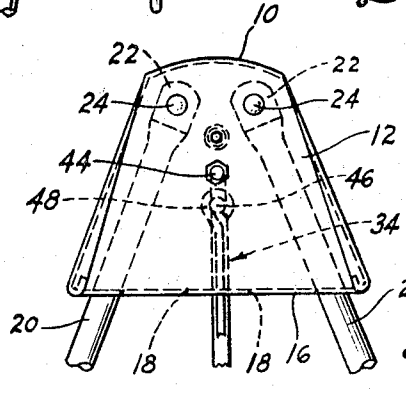


Fig. 4

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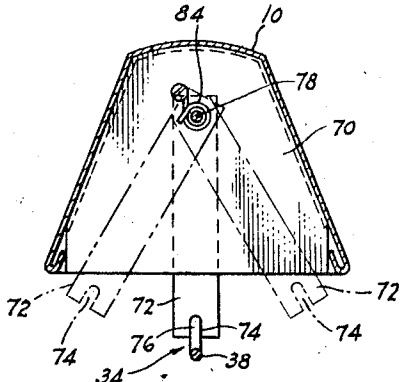


Fig. 5

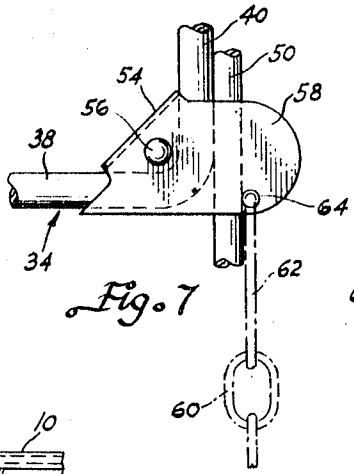


Fig. 7

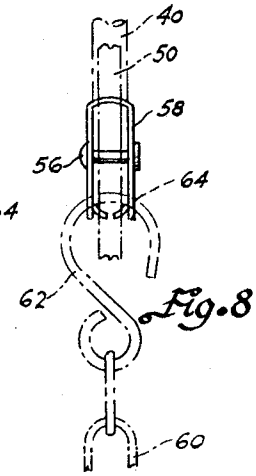


Fig. 8

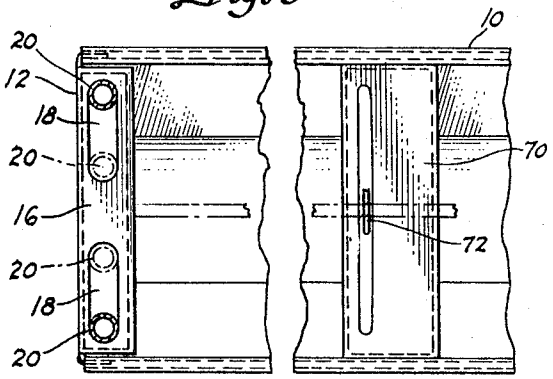
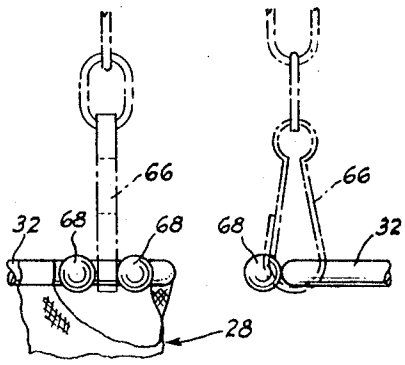


Fig. 6



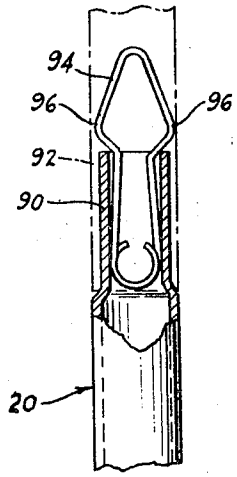


Fig. 11

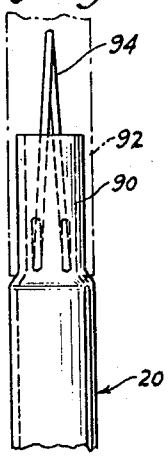


Fig. 12

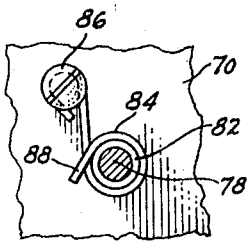


Fig. 9

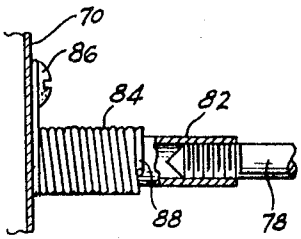


Fig. 10

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United States Patent Office 3,459,423 Patented Aug. 5, 1969

3,459,423

TORSION BAR SWING CONSTRUCTION

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Filed June 14, 1963, Ser. No. 287,998
Int. Cl. A63g 9/16; A47d 13/10
U.S. Cl. 272—86 10 Claims

This invention relates to improvements in a swing construction and, more particularly, to a juvenile swing construction embodying improvements described hereinafter. Without restriction thereto, the swing particularly is adapted to be power operated and, while especially suitable for the amusement of small children, the same principles may be applied to swings for dolls, as well as for human infants and young children.

Various kinds of swings have been devised heretofore which are capable of being set up and supported on horizontal surfaces, such as floors in a home or recreation room. Some of these previously developed swing constructions also have employed power means for operating the swing to oscillate the seat thereof. These prior swings, however, have had certain shortcomings, principally in regard to the bracing of the legs relative to the supporting head, as well as involving complex power means for oscillating the depending seat.

It is the principal object of the present invention to provide a juvenile swing embodying legs depending from a head by mechanism which provides maximum rigidity when the swing is set up and operating so as to minimize danger of a child upsetting the swing while accommodated therein.

Another object of the invention is to provide supporting means for a seat within the aforementioned swing construction, which is extremely simple and yet affords means which not only brace the seat-supporting means against appreciable lateral movement, but also afford simple and effective means by which the seat may be oscillated about its pivotal axis manually or by power means disposed within the head of the swing structure, and obtain a longer "ride" period than otherwise because of such prevention of lateral movement.

A further object of the invention is to provide torsion bar means and seat-supporting means depending therefrom which provide maximum supporting ability coupled with minimum complexity, said mechanism also readily being capable of compact foldability for merchandising and storage.

Details of the foregoing objects and of the invention, as well as other objects thereof, are set forth in the following specification and illustrated in the accompanying drawings comprising a part thereof.

In the drawings:

FIG. 1 is a perspective view of a swing construction embodying the principles of the present invention and illustrated in set-up, operative condition.

FIG. 2 is a side view of the swing shown in FIG. 1 disposed in compacted, folded position for storage.

FIG. 3 is a fragmentary front view of the upper portion of the swing construction shown in FIG. 1, illustrated on a larger scale than employed in FIG. 1, and showing details of the torsion bar suspension mechanism supported by the head of the swing construction.

FIG. 4 is a fragmentary end view of the structure shown in FIG. 3, as seen on the line 4—4 of said figure.

FIG. 5 is a transverse vertical sectional view through the head construction shown in FIG. 3, as seen on the line 5—5 of said figure.

FIG. 6 is a fragmentary, foreshortened bottom plan view of the head portion of the swing construction shown in the preceding figures and illustrating, in full lines, the position of the legs with respect to the head when in extended, supporting position, and, in broken lines, showing the position of said legs with respect to the head when the swing construction is folded, as illustrated in FIG. 2.

FIGS. 7 and 8 respectively are front and side fragmentary vertical elevations, on a larger scale than in the preceding figures, and illustrating parts of the supporting means for the seat of the swing construction.

FIGS. 9 and 10 respectively are fragmentary end and side elevations of clutch means for the mechanism by which the power means is energized.

FIGS. 11 and 12 respectively are fragmentary side elevations taken at 90° to each other and illustrating connecting means for telescoping sections of the legs of the swing construction.

Referring to FIGS. 1 and 3 particularly, it will be seen that the swing construction embodying the principles of the present invention comprises a head **10**, which may be formed from sheet metal or other suitable material, such as fiber reinforced plastic, or the like, and comprises an inverted trough having opposite ends **12** and **14**. In the preferred construction, the ends **12** and **14** extend downward and outward, at a very acute angle with respect to each other, as best seen in FIG. 3, for purposes to be described. The lower portions of said ends are bent inwardly to provide substantially horizontal flanges **16**, one of which is shown in bottom plan view in FIG. 6. Said flanges are provided with a pair of longitudinally aligned slots **18** through which legs **20** extend.

In the preferred construction thereof, the legs **20** comprise a plurality of interconnected sections which are provided with interfitting, telescopic portions, details of which are shown in FIGS. 11 and 12 and are described hereinafter. For purposes of attractive finish, ease of manufacture, and maximum strength, the legs **20** preferably are formed from tubular metal. The uppermost section of each leg **20**, at its upper end, preferably is flattened to provide an ear **22**. Each of said ears are pierced to provide a pivot hole receiving a suitable pivot, such as a bolt or rivet **24**. The legs may be pivotally moved between the positions shown in FIGS. 1 and 4, which is the extended, supporting position, and the contracted or folding position shown in FIG. 2. Movement of the legs between these respective positions is principally controlled by the ends of the slots **18** in the flanges **16**. Additional bracing between the pairs of legs at the opposite ends of the head **10** is afforded by the collapsible transverse brace members **26**, which are connected at the ends thereof to said pairs of legs.

As will be seen especially from FIG. 3, the legs **20** preferably are substantially parallel to the diverging ends **12** and **14** of head **10**, whereby the head is supported, in effect, by somewhat pyramidal arrangement of four legs in that the legs of each pair, which are connected to the ends **12** and **14** of the head **10**, not only extend divergingly apart in a direction transverse to the head **10**, but the pairs of legs are arranged in diverging relationship as shown in FIG. 3. Further, the confining of the legs within the slots **18** of flanges **16**, which are preferably integral with the ends **12** and **14** of head **10**, results in very substantial rigidity between the legs and head **10**, not only in a transverse direction, but especially in a longitudinal direction with respect to the axis of the head **10**. Accordingly, both pairs of legs are arranged to resist movement applied against the opposite ends of the head **10**, due to the slot arrangement in flanges **16**, as distinguished from only a single pair of such legs being able to resist such movement as would be the result if the slotted flanges **16** were not provided.

The swing construction also, preferably, is provided with a seat **28**, which, both from the standpoint of comfort, as well as economy in manufacturing, preferably is formed

from a rigid frame comprising stiff wire of suitable gauge, said frame having an upwardly extending back portion **30**, and a forwardly extending front portion **32**. The preferably flexible fabric seat is connected to the frame by appropriate hems, in accordance with conventional construction of such type.

The seat **28** is supported by very simple but highly effective means comprising a torsion bar **34**, which, in the preferred construction, is U-shaped and has substantially horizontal, opposite pivot ends **36** which are coaxial. Intermediately of said pivot ends **36** is a central, substantially horizontal portion **38**, the same being supported by a pair of legs **40**, which are integral with the portion **38** and pivot ends **36**. The pivot ends **36** extend through appropriate, simple bearings **42**, which are formed in the ends **12** and **14** of head **10**, said bearings, for example, being made from appropriate molded synthetic resin having self-lubricating properties. To accurately position the torsion bar relative to the head, the terminal ends of the pivot ends **36** are threaded so as to receive cap nuts **44**.

The pivot ends **36** also preferably are bent to provide notched portions **46**, which receive loops **48** formed in the upper ends of a part of seat-supporting means, said part preferably being rigid and comprising elongated, rigid links **50**, the lower ends of which have hooks **52** formed therein, as shown in FIGS. 1 and 2, said hooks conveniently engaging corner portions of the back **30** of the frame of the seat **28**, the flexible covering of the seat preferably being cut away adjacent said corner portions to render the corners of the frame accessible, as shown in FIG. 1.

The torsion bar **34** conveniently may be formed from heavy wire stock of suitable gauge to insure against appreciable deflection which is essential to the invention. In view of the fact that the notched portions **46** preferably are formed near the opposite ends of the torsion bar, notwithstanding the fact that the entire weight of the seat and its occupant is sustained by said torsion bar, the gauge of wire from which the torsion bar is formed need not be excessively heavy. Further, if desired, it is conceivable that the torsion bar could be formed from square or rectangular bar stock of suitable gauge and size, or even stamped from sheet metal, if desired, the pivotal end portions of the torsion bar, of course, being appropriately shaped to render the same capable of being disposed in bearings **42**.

The upper portion of the rigid links **50** are so shaped in front elevation, as seen in FIG. 3, that an appreciable portion thereof preferably is closely parallel to the depending legs **40** of the U-shaped arrangement of torsion bar **34**, as also is clearly shown in FIG. 3. Means to connect the links **50** and torsion bar are provided in the form of simple, pressed metal couplers **54**. Such metal is bent so as to be disposed in the corner portions comprising right-angled bends which connect the ends of the central portion **38** with the legs **40**. Suitable means, such as a rivet **56**, hold the couplers **54** connected to the torsion bar and a pair of spaced ears **58** extend outwardly from the coupler to receive between said ears the links **50**. Such disposition of the links **50** between the ears **58** effectively insures that the torsion bar **34** and links **50** will swing in unison with each other.

The supporting means for the seat **28** also includes other parts than the rigid links **50**, said other parts, in the preferred embodiment thereof, comprising simple, flexible chains **60**. At the upper end of each chain is a simple hook **62**, which has a dual purpose, one being to support the front part of the seat **28** from the torsion bar **34**, and the second purpose is to lock or secure the links **50** against the legs **40** of torsion bar **34** and between the spaced ears **58** thereof by extending through holes **64**, which pierce the ears **58** and closely receive the hooks **62** therethrough. The lower ends of the chain **60** also preferably have snap-hooks **66** connected thereto for purposes of securing the lower ends of the chains to the front part **32** of the rigid frame of the seat. In the preferred construction, suitable positioning means for the hooks **66** may be provided on said frame. One practical embodiment of such positioning means comprises a pair of spaced balls **68**, which may be welded or otherwise fixed to the frame **32** for purposes of receiving the hooks **66** therebetween. A pair of such balls **68** is provided respectively adjacent opposite ends of the horizontal front bar of the forwardly extending portion **32** of the frame of the seat.

When it is desired to store the swing unit, it is only necessary to collapse the horizontal braces **26**, move the lower ends of the legs **20** into close relationship with each other, as shown in FIG. 2, disconnect the hooks **66** from the front part **32** of the frame of the seat **28**, and permit the seat to be disposed in hanging relationship, as also shonw in FIG. 2, whereupon the collapsed swing assembly may be stored within a relatively small space, such as in a closet, or easily can be carried in the deck or rear seat compartment of a motor vehicle, or the like. Restoring the swing unit to operative position merely requires the spreading of the legs of each pair, snapping the brace members **26** into extended position, and connecting the hooks **66** with the forward portion of the frame of the seat **28**, such operation merely requiring a few seconds time.

While the swing construction thus far described is capable of satisfactory use for the enjoyment of infants occupying the seat **28**, or by children playing with dolls disposed in the seat, for example, whereby it is only necessary to push the seat **28** lightly so as to swing the same in oscillating manner from the pivotally supported torsion bar **34**, the present invention contemplates that the swing may be operated by power means comprising an exemplary power unit **70**, which is secured by appropriate bolts, bent ears, or the like, not shown, to the interior of the head **10**. Said power means, as illustrated, primarily is intended to be exemplary, since it may comprise an electric motor and suitable mechanism attached thereto and operated thereby so as to oscillate a driving lever **72**, which depends from the lower portion of the power unit **70**, as best shown in FIG. 5, but also as shown in FIG. 3. The lower end of the lever **72** preferably has a notch **74** which receives the central portion **38** of torsion bar **34**. For convenience in not having the lever **72** of undue length, the central portion **38** is provided with a hump **76**, which extends upwardly and the middle portion of said hump is disposed within the notch **74** of lever **72**, as clearly shown in FIG. 3.

In the form illustrated in the present drawings, it is contemplated that the power unit shall be spring driven, employing any appropriate actuating means, not shown, by which the lever **72** is oscillated. The spring power principally is derived from a coiled spring, which is wound through the means of a crank **78** having a suitable knob **80** on the outer end thereof. The inner end of crank **78** may be threaded, or otherwise secured, preferably detachably, to a winding arbor **82** for the spring of the power unit **70**, as best shown in FIGS. 9 and 10. The arbor **82** is of the type which is wound unidirectionally, and such movement is assured by an appropriate clutch **84**, a simple form of which can comprise a coiled spring of slightly smaller diameter than the outer diameter of arbor **82**. One end of the coil is fixed to the housing of the power unit **70** by a screw **86**, while the opposite end comprises a protruding ear **88** by which, if desired, the clutch may be released simply by moving the ear **88** in a direction to enlarge the coil of the clutch **84**.

When the power unit **70** is energized, such as by winding the spring thereof through the medium of crank **78**, the driving lever **72** commences to oscillate and thereby oscillates the torsion bar **34** about its pivots in the ends of the head **10**, successively in opposite directions through a desired range of movement indicated in exemplary manner by the two dotted line illustrations of the lever **72** in FIG. 5 respectively on opposite sides of the full line illustration thereof in said figure. The maximum extent of such oscillation is controlled by the actuating means for the lever **72**. The power cycle for the unit **70** may be of any desired duration, such as for a period of 10 or 15

minutes, or any other period desired of which the unit is capable of being energized.

Especially for purposes of facilitating the packaging of the swing unit for merchandising and transporation, as has been indicated above, the legs **20** preferably are formed from a plurality of sections, the opposite ends of which telescope with respect to each other, somewhat in the manner illustrated exemplarily in FIGS. 11 and 12. For example, the upper end of each section of the leg **20** comprises a projection **90**, the outer diameter of which preferably snugly engages the inner diameter of the socket portion **92** on the lower end of each section of the leg **20**. To provide additional friction, one preferred means suitable for use comprises a spring member **94**, which is secured at its lower end, by any suitable means, within the interior of the projection **90**, and the upper end thereof, which projects beyond the projection **90**, has opposed engaging portions **96**, which frictionally engage the interior of the socket portions **90** on the lower ends of the adjacent leg sections. Such means permits ready connection and disconnection of the sections of the legs with respect to each other, without interfering with the operation or requiring any tools to accomplish such connection and disconnection. The projections **90** and socket portions **92** preferably are of appreciable length so as to afford adequate rigidity when the sections of the legs **20** are assembled. As shown in FIG. 1 in exemplary manner, each leg **20** comprises three of such sections in each leg.

In addition to the legs **20** being composed of a plurality of quickly connected and disconnected sections so as to render the swing unit capable of being packaged compactly, it will be seen also from FIG. 3 that, after the rigid links **50** have been disconnected from the seat **28**, they may be swung to the dotted line positions thereof shown in FIG. 3 and, after being so disposed and upon moving the uppermost sections of the legs **20**, which are pivotally connected to the head **10**, into the compacted or collapsed position shown in FIG. 2, it can be visualized that said collapsed upper portion of the entire swing unit may be disposed within a suitable carton of moderate size. The seat **28**, preferably being covered with flexible material, such as appropriate fabric, readily may be collapsed into relatively flat condition and disposed within the carton between the collapsed leg sections. The two additional telescopically connectable sections of each leg, making a total of eight additional sections in all, also readily may be disposed within such carton. The chains **60**, likewise, readily are collapsible into the interior of the carton and upon the links **78** being disconnected from the power unit, they also simply may be dropped into the carton and the carton then sealed, along with an appropriate instruction sheet as to how the unit is to be unpacked and assembled.

From the foregoing, it will be seen that the present swing construction comprises an extremely simple yet highly durable and effective pleasure-affording toy for a child or infant, either disposed within the seat of the swing unit, or for a child to play with dolls seated within the swing. The torsion bar construction serves in the dual capacity not only of pivotally supporting the seat and suspended supporting means for the seat relative to the head, but, also, because of the function of its configuration, affords ready means of bracing rigid supporting links which depend from the torsion bar and are connected effectively to substantially vertical legs thereon in such manner as to minimize lateral movement of the seat of the swing in directions substantially parallel to the longitudinal axis of the head **10**. The torsion bar has been designed upon a well recognized theory of mechanical vibration that the initial force applied to a pendulum, which is the torsion bar above, obtains the maximum oscillation or amplitude when such initial force is applied at the natural frequency of the pendulum. As a result, only a minimum amount of such initial force is required and all of the manual or power force applied to the swing to push it during operation also is forcibly channeled by this designed operation of the torsion rod into a vertical plane perpendicular to the axis of the torsion bar. This is due to the fact that no appreciable wobble or sideplay is permitted, whereby a longer "ride," as well as a very smooth and gentle "ride," is produced to induce pleasure and even sleep in a young child. Of equal importance is the providing of maximum safety to the occupant due to substantial freedom from danger of the swing toppling over.

To insure maximum advantages of the foregoing improvements and possibilities, it is essential that the dimensions and manufacturing tolerances be relatively close and observed in the production of the swing, and particularly those parts thereof which contribute to the minimizing of lateral sway or vibration which could contribute to accidents resulting from the operation of the swing. Further, the U-shaped configuration of the torsion bar and the rigidity thereof against deflection results in maximum swinging efficiency when the swing is energized either manually or by powered driving means applied to the torsion bar so as to oscillate the same automatically, when desired. In addition to such minimizing of lateral movement of the seat with respect to the supporting head of the swing unit, the particular arrangement of legs and the means connecting the same to the head is such as likewise to afford maximum bracing of the entire unit, and especially the head, against longitudinal or lateral movement, relative to the plane within which the swing oscillates, thereby affording maximum safety to the occupant of the swing, as well as affording a smooth, lulling "ride."

While the invention has been described and illustrated in its several preferred embodiments, and has included certain details, it should be understood that the invention is not to be limited to the precise details herein illustrated and described since the same may be carried out in other ways falling within the scope of the invention as claimed.

I claim:

1. A swing for juvenile use comprising in combination, a head having spaced ends, supporting legs depending downward and outward from said head adjacent said ends thereof to said torsion bar and suspended therefrom, ported respectively by said ends of said head and having rigid means depending downwardly from the pivotal axes of said ends of said bar and spaced apart transversely of said bar, a seat, supporting means for said seat extending upwardly therefrom and connected at the upper ends theerof to said torsion bar and suspended therefrom, means connecting said supporting means and rigid depending means on said bar at a location below the pivotal axis of said torsion bar for pivotal movement of the same in unison, power means supported by said head independently of said torsion bar, and driving means operated by said power means and engaging said rigid means depending downwardly from said torsion bar and operable to oscillate said torsion bar about the pivotal axis thereof to move the seat of the swing in similar oscillating manner.

2. The swing set forth in claim **1** further characterized by said driving means comprising a lever oscillated by said power means independently of said torsion bar and the lower end portion of said lever engaging the depending means of said torsion bar with sufficient force to oscillate the same with minimum power.

3. The swing set forth in claim **1** further characterized by said head comprising an inverted trough and the ends thereof having inturned flanges provided with axially aligned slot means of limited length, and said head further including means pivotally connecting the upper ends of said legs to said ends of said head and said legs extending through said slot means to restrict the pivotal movement thereof and also brace said legs against movement in directions transverse and longitudinal relative to

said head when said legs are extended to normal supporting position thereof relative to said head.

4. The swing set forth in claim 3 further characterized by said ends of said head extending downward and outward from each other and said legs being substantially parallel thereto, thereby extending outward and downward in both transverse and longitudinal directions relative to said head to provide firm bracing of said swing against movement in said directions when being operated with an occupant in said seat.

5. A child's swing comprising in combination, a horizontal elongated head having opposite ends, supporting legs connected at one end to said head adjacent the ends thereof and extending downward and outward therefrom, a substantially U-shaped torsion bar having pivot means adjacent the outer ends of the legs of said bar pivotally supported by said head and said legs of said bar depending from said pivots thereof, a seat, supporting means for said seat comprising a plurality of parts, certain of said parts of said supporting means being rigid and depending from said torsion bar for support of said seat by said bar, connecting means on said legs of said torsion bar comprising spaced ears receiving said rigid supporting means therebetween to secure the same to said legs, and hooks on other parts of said supporting means extending between the ends of said ears and operable to prevent removal of said rigid supporting means from between said ears, whereby said supporting means and seat oscillate in unison with said torsion bar.

6. The child's swing set forth in claim 5 further characterized by said other parts of said supporting means comprising elongated flexible means extending upward from said seat and said hooks being connected to the upper ends thereof.

7. The child's swing set forth in claim 5 further characterized by said seat having a relatively rigid frame having an upwardly extending back part and a forwardly extending front part, said rigid parts of said supporting means comprising rigid elonated links connected to said back part of said seat frame and said other parts of said supporting means comprising flexible chains connected to the front part of said seat frame.

8. The child's swing set forth in claim 7 further including means pivotally connecting the upper ends of said legs to the ends of said head and operable to permit the lower ends of said legs to be moved toward each other to render the swing compact for storage and said seat upon disconnection of said chains from said seat permitting said seat to be suspended downward from said rigid links in a compact manner relative to said legs.

9. A swing suspension comprising a horizontally arranged support housing having a pair of spaced apart end wall supports; a horizontally arranged torsion bar made of stiff, rod-like material and having its opposite ends each rotatably connected to one of said end wall supports, the central portion of said torsion bar being bent into an upwardly opening, deep U-shape whose legs are substantially vertically arranged and whose base is horizontally arranged, with the base and legs joining at relatively sharp bent corners; a motor supported in said housing, the motor having a driven, reciprocating lever extending downwardly therefrom and being connected to the center of said base for reciprocating said torsion bar about its rotatably connected ends; a swing having a pair of elongated, upright arranged swing support rods, each arranged adjacent to one of said legs and having its upper end connected to the torsion bar at a point located between the respective leg and torsion bar end and extending downwardly at an angle to the vertical to contact its respective leg just above its connection to said horizontally arranged base, the rods further extending downwardly in contact with its respective leg and then extending further downwardly and having its lower end located at a considerable distance beneath the torsion bar with the lower end being formed with means for connection to said swing; means connecting the upright rods to their respective legs at the bent corners where the legs join said base.

10. A construction as defined in claim 9 and including a shallow, upwardly opening, U-shaped bend formed in the torsion bar between each of said legs and the torsion bar ends adjacent respectively thereto; and a bent loop formed on the upper end of each support rod, the upper ends of each support rod being connected to the torsion bar by means of said loops each being looped around the base of the shallow U-shaped bend located adjacent its respective legs.

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RICHARD C. PINKHAM, Primary Examiner

THOMAS ZACK, Assistant Examiner

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248—370; 297—274, 277