June 6, 1972 E. BARRETT 3,667,756

MOTOR OPERATED CHILD'S SWING

Filed Dec. 16, 1969 3 Sheets-Sheet 1

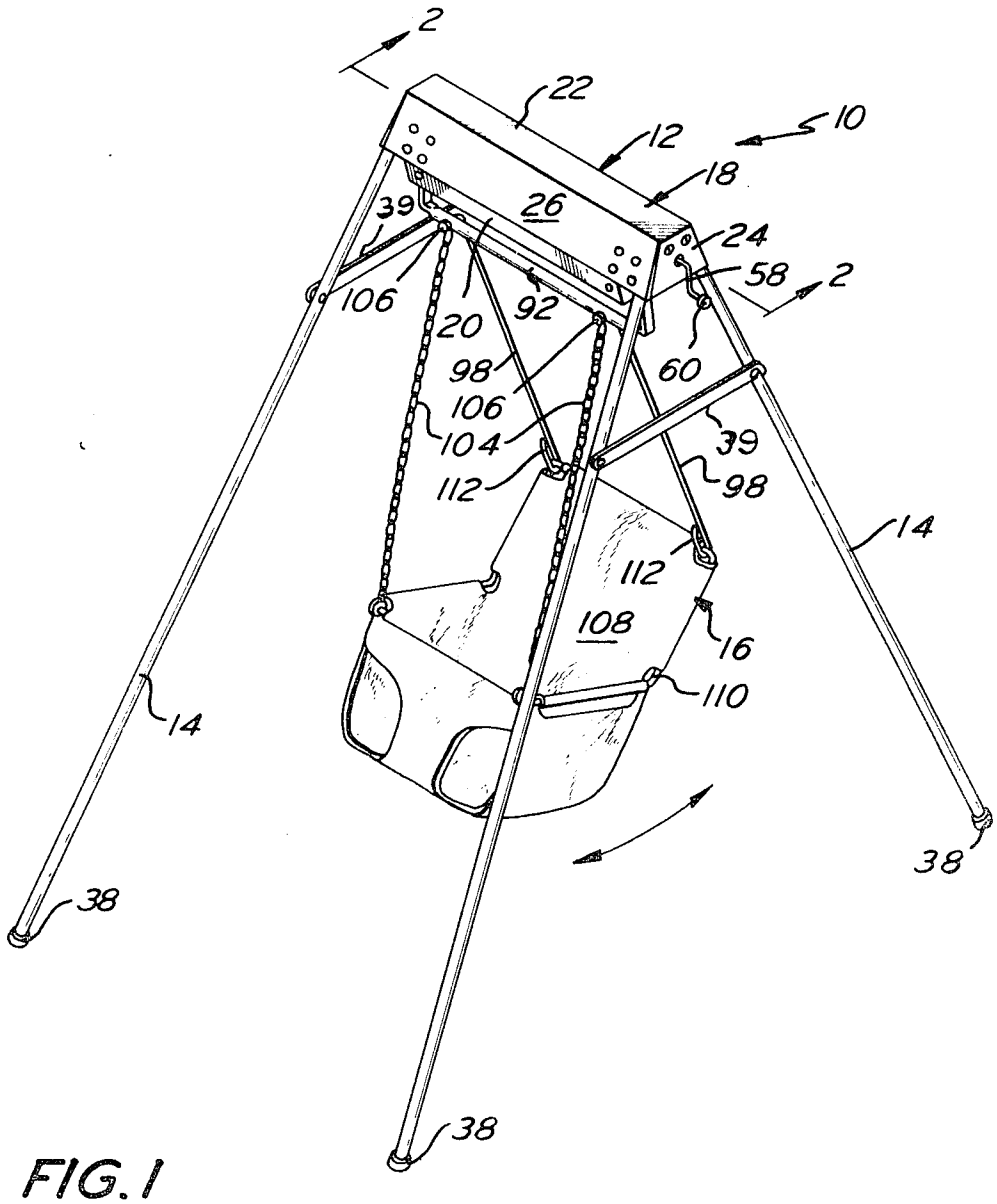


FIG. 1

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MOTOR OPERATED CHILD'S SWING

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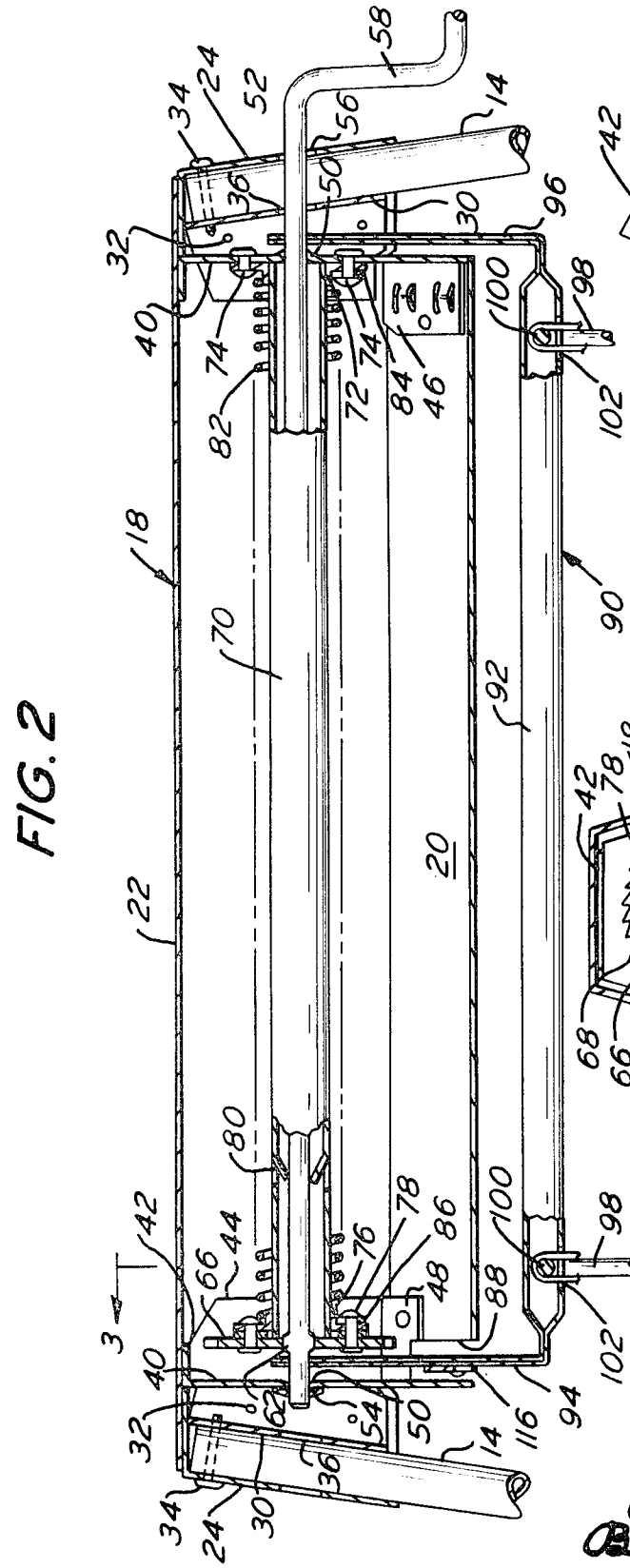


FIG. 2

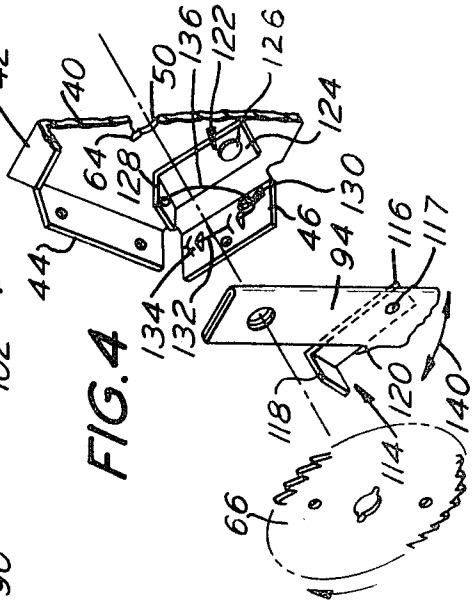


FIG. 4

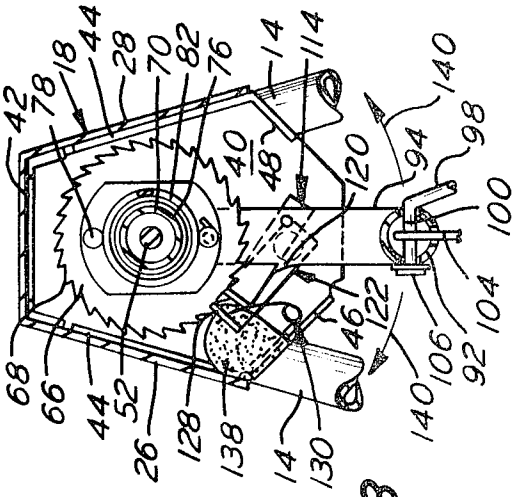


FIG. 3

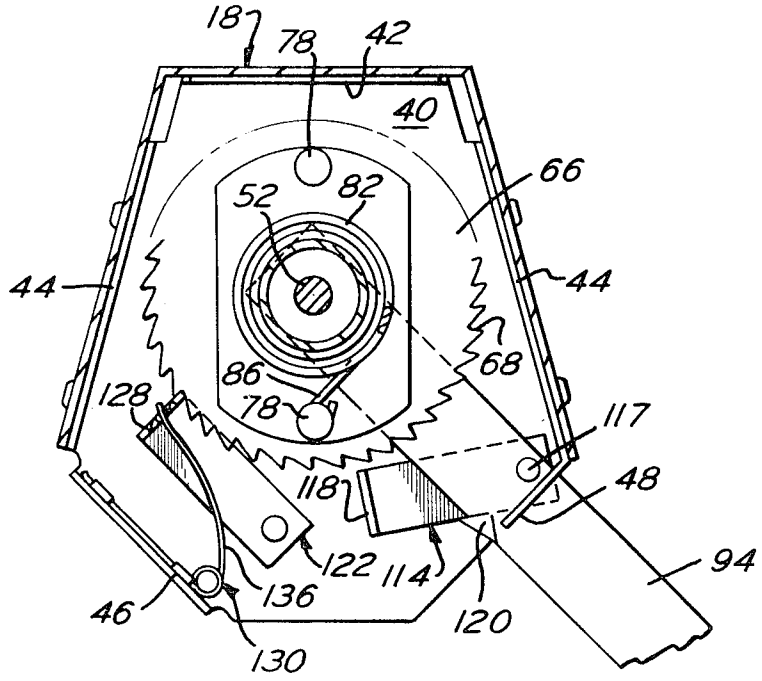
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MOTOR OPERATED CHILD'S SWING

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FIG.5



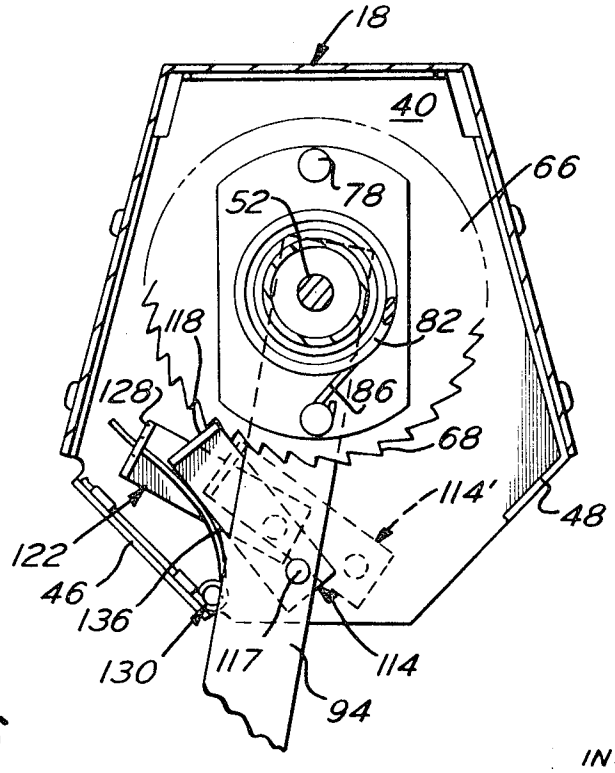


FIG.6

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MOTOR OPERATED CHILD'S SWING

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Int. Cl. A63g 9/16
U.S. Cl. 272—86 9 Claims

ABSTRACT OF THE DISCLOSURE

A child's swing operated by a spring motor. The swing includes a frame, upstanding legs supporting the frame and a swing seat suspended from the frame. The spring motor includes a coiled spring having one end secured to a ratchet wheel and the other end secured to the frame. A first pawl is pivotally mounted on the frame and a second pawl is pivotally mounted on a hanger bar which supports the swing seat. The hanger bar is freely pivotally suspended by a rod secured to the ratchet wheel. The swing is powered by the coiled spring and alternate engagement of the pawls in the ratchet wheel, thereby unwinding the spring. Sound deadening means is associated with the pawl mounted on the frame to reduce the noise of the engagement and disengagement of the pawl with the ratchet teeth.

This invention relates to a child's swing, and more particularly, to a child's swing that is powered by a spring motor.

Baby swings actuated by spring motors are now in common usage. The motors are wound and the swing is then set in operation, and will continue to reciprocate in a small arc under the power of the spring motor until the tension of the spring is fully unwound. Swings of this type normally operate for twelve to fifteen minutes each time the spring is wound, and the swings serve to keep a young child occupied and relaxed for this period of time. The swings are also an aid in putting a young child to sleep.

One type of swing presently in use includes a spring motor that has one end of the spring secured to a reciprocating cradle and the other end secured to a shaft which is used to wind the spring. The device of this invention provides a number of specific improvements over the automatic swing including the cradle.

In the swing of this invention, the cradle has been eliminated and replaced by a hanger bar. Having a hanger bar obviates the possibility of pinched fingers between the cradle and the swing housing. It has been found that fingers can be pinched by the cradle against the housing when the swing is in operation, or when the spring motor is wound. This occurred because one end of the spring was secured to the cradle, and when the spring was wound, the cradle would suddenly be forced against the housing. In the device of this invention, the hanger bar is freely rotatable on the rod used for winding the spring. Accordingly, the hanger bar will remain in a substantially vertical orientation during the entire winding operation. The hanger bar is propelled by the spring motor only during the use of the swing.

Another improvement embodied in the swing of this invention is the provision of sound deadening means on the pawl in contact with the ratchet wheel of the spring motor. It has been found that when utilizing the prior art spring motor operated swings, an extremely loud chattering sound was made when the ratchet wheel was wound during the winding of the spring. This chatter was caused by the engagement of the ratchet teeth with the pawl contacting them. In the swing of this invention, sound deadening means is provided to reduce the noise occasioned by the winding of the spring and to reduce the noise involved during the operation of the swing when the spring is being unwound.

It is accordingly an object of this invention to provide a novel child's swing.

It is another object of this invention to provide a novel child's swing that is operated by a spring motor.

These and other objects of this invention are accomplished by providing a spring motor for operation of child's swing comprising a frame, a rod rotatably mounted in said frame, a ratchet wheel secured to said rod, a hanger bar suspended from said rod, said hanger bar having a first pawl pivotally mounted thereon, a second pawl pivotally mounted on said frame, said second pawl being urged into contact with the teeth of said ratchet wheel by spring means, said second pawl being urged out of contact with said ratchet wheel when said first pawl contacts said spring means, with said first pawl being engaged by said ratchet teeth when said second pawl is out of engagement with said ratchet teeth, and said second pawl being returned to engagement with one of said ratchet teeth when said hanger bar is urged out of engagement with said ratchet teeth by the power furnished by the spring urging said ratchet wheel which in turn urges said first pawl in a direction away from said spring means.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a perspective view of the child's swing embodying this invention;

FIG. 2 is an enlarged sectional view taken along the line 2—2 of FIG. 1;

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 2;

FIG. 4 is an exploded perspective view of the elements of the escapement mechanism for the ratchet wheel;

FIG. 5 is a sectional view similar to FIG. 3, but showing the position of the pawls at one end of the arc of the hanger bar; and

FIG. 6 is a sectional view similar to FIG. 5, but showing the position of the pawls at the other end of the arc of the hanger bar.

Referring now in greater detail to the various figures of the drawings wherein like reference characters refer to like parts, a chlid's swing embodying the present invention is generally shown at **10** in FIG. 1. Device **10** basically comprises a frame **12** having supporting legs **14** and a seat **16** suspended therefrom.

Frame **12** comprises an upper housing **18** and a lower housing **20** secured thereon. Upper housing **18** includes a top plate **22**, side plates **24** which flare outwardly (FIG. 2), a front plate **26** (FIG. 3) and a rear plate **28**. Braces **30** extend from rear plate **28** to front plate **26** and are riveted to the front and rear plates, as shown at **32** with respect to rear plate **28** in FIG. 2. As seen in FIG. 2, the braces **30** have one surface that lies in a plane parallel to side plates **24**. The side plates **24** are spaced from braces **30** a distance equal to the diameters of the legs **14**, and the legs **14** are mounted between braces **30** and side plates **24** by sheet metal screws **34**. Braces **30** also include openings **36** on the sides which are parallel to end plates **24**.

Legs **14** are formed tubular steel, and as seen in FIG. 1, flare outwardly from the frame **12**. The flaring is accomplished because the plates **24**, **26** and **28** all taper outwardly in going from top plate **22** downward. Having the flared positioning of the legs provides a more stable structure when a child is supported in the swing, and prevents the inadvertent tipping of the swing. Rubber or plastic end

caps 38 are placed at the bottoms of the legs. Legs 14 are pivotable around screws 34 for collapsing the swing, and are held in the open position by side straps 39 (FIG. 1).

Mounted within housing 18, and forming a part of the frame, is a pair of supporting plates 40. Each supporting plate 40 is vertically extending within housing 18, and includes an upper flange 42 which is mounted against top plate 22 of housing 18. Each plate further includes a pair of side flanges 44 which are riveted to side plates 26 and 28 of housing 18 (FIG. 3). Each plate 40 further includes a first bottom flange 46 (FIG. 4) and a second bottom flange 48 (FIG. 2). As seen in FIG. 2, since plates 40 are arranged in a position whereby they face each other, the bottom flange of one plate 40 will be aligned with the bottom flange 46 of the other plate 40. Each plate 40 is provided with an outstruck opening 50.

A horizontally extending rod 52 is received in outstruck openings 50 of plates 40. Rod 52 is held in place by clip 54 formed of spring steel. Rod 52 passes through opening 56 in end plate 24 and opening 36 in brace 30. A crank arm 58 forms a part of rod 52, and a knob 60 (FIG. 1) is rotatably mounted on the end of arm 58.

Rod 52 is provided with a pinched portion 62 adjacent one end thereof (FIG. 2). Openings 50 in plates 40 are provided with aligned slots 64 to permit the pinched portion of rod 52 to pass therethrough. A ratchet wheel 66 is provided with a pair of slots which receive the pinched portion 62 thereby keying the ratchet wheel to the rod 52. Ratchet wheel 66 contains a plurality of equally spaced ratchet teeth 68 around its circumference.

A tube 70 is telescoped over rod 52 and is mounted between ratchet wheel 66 and one supporting plate 40. One end of tube 70 is secured by a collar 72 which is riveted to plate 40, as shown at 74. A second collar 76 is riveted to ratchet wheel 66, as shown at 78. Tube 70 includes outstruck tabs 80 which are used for the alignment of rod 52 when it is passed through tube 70 during the assembly of the swing. Thus the tabs 80 insure that rod 52 will pass through the opening in ratchet wheel 66 during the assembly process.

A coiled tension spring 82 is telescoped over tube 70. One end 84 of the tension spring is rigidly mounted with respect to plate 40 by rivet 74. The other end 86 of spring 82 is rigidly mounted with respect to ratchet wheel 66 by rivet 78.

The lower housing section 20 is mounted on the bottom of upper housing section 18 by riveting it to flanges 46 and 48 of plates 40. A slot 88 is formed in lower housing section 20. A hanger bar 90 having a central horizontal section 92 and vertically extending arms 94 and 96 is suspended from rod 52 by passing the rod through holes formed in arms 94 and 96. Arm 94 is received in slot 88 of lower housing section 20. Arm 96 is positioned between plate 40 and a side brace 30, beyond the outer edge of lower housing section 20.

Hanger bar 90 is formed from a tube, with the horizontal section 92 being retained in a tubular shape. The ends of the tube are flattened in order to form vertical arms 94 and 96. A pair of hanger rods 98 (FIG. 1) is supported by horizontal section 92 of hanger bar 90. Each rod 98 includes an upper bent portion 100 (FIG. 3) that passes through a pair of aligned holes in hanger bar 90. Horizontal section 92 includes an upwardly projecting slot 102 beneath the holes formed for bent portions 100. A chain 104 (FIG. 1) passes upwardly through each slot 102 and is received on the bent portion 100 of each rod 98. The rod then passes through the front of horizontal tube 92 where it is held in place by caps 106.

Rods 98 and chains 104 support seat 16. The seat 16 comprises a flexible body supporting section 108 and a metal frame 110. Any of the seats known to the art can be used in carrying out this invention. The seat shown is supported by the placing of the metal frame sections 110 in hooks 112 of rods 98 and in one of the links of chains 104.

Vertical arm 94 of hanger bar 90 has a pawl 114 (FIG. 4) mounted thereon. Pawl 114 includes a plate 116 that is pivotally mounted on arm 94 by rivet 117. A flange 118 projects perpendicularly from plate 116. Arm 94 includes an outstruck tab 120 (FIGS. 4 and 5) on which pawl 114 rests.

A second pawl 122 (FIG. 4) is mounted on plate 40 which is adjacent ratchet wheel 66. Pawl 122 includes a plate 124 which is pivotally mounted on plate 40 by rivet 126. A flange 128 projects from plate 124. A hairspring 130 (FIG. 4) has one arm 132 received in outstruck loops 134 of flange 46 on the plate 40 adjacent ratchet wheel 66. The other arm 136 spring 130 is received in an opening formed in flange 128 of pawl 122. The spring 130 urges pawl 122 in a clockwise direction, as viewed in FIG. 4, around rivet 126.

In FIGS. 3, 5 and 6, the spring motor and the manner in which the escapement mechanism operates are shown. In these figures, the bottom housing section 20 has been removed for the purpose of clarity and ease of understanding of the operation of the spring motor. Referring to FIG. 3, the at-rest position of the hanger bar arm 94 is shown. When in this position, pawl 114 rests on the tab 120 of arm 94. Pawl 122 is engaged in one of the teeth 68 of ratchet wheel 66. A piece of foam material 138 is positioned beneath flange 128 of pawl 122, and the flange is actually embedded in the foam. The foam can be polyurethane foam or latex foam. The purpose of the foam is to serve as a sound deadening means as the pawl 122 is engaged and disengaged from the ratchet teeth 68 during the winding and escapement functions of the spring motor.

The device of this invention is used by first winding crank arm 58 in a clockwise direction, as viewed in FIG. 1. Since ratchet wheel 66 is keyed to rod 52, the rotation of the crank arm will cause the ratchet wheel to rotate in a clockwise direction, as viewed in FIG. 3. During the rotation of the ratchet wheel, flange 128 of pawl 122 will be moved out of engagement with the ratchet teeth 68 in view of the shape of the ratchet teeth, which permit the winding in a clockwise direction. However, whenever the winding is stopped, flange 128 will engage the forward edge of a ratchet tooth under the urging of spring 130. Pawl 114 will be slightly removed from the ratchet teeth during the winding of the crank arm 58. In this connection, it should be noted that arms 94 and 96 of hanger bar 90 are freely pivotally mounted on rod 52. Accordingly, when the rod 52 is turned, thereby turning ratchet wheel 66, the arms 94 and 96 will remain substantially vertical. When in the vertical orientation, the pawl 114 is slightly removed from the ratchet teeth 68.

The turning of the ratchet wheel 66 will in turn place a tension on coiled spring 82, since one end of the coiled spring is rigidly mounted with respect to the ratchet wheel by rivet 78 and the other end 84 of the coiled spring is rigidly mounted on plate 40. The winding of the spring supplies the moving force for the spring motor comprising the spring, ratchet wheel and the pawls. The spring is prevented from unwinding by the engagement of pawl 122 in ratchet teeth 68. The fact that the hanger bar is not moved during the winding of the spring is one of the features of this invention. In the prior art, the spring had one end secured to a cradle which supported the spring. Accordingly, when the spring was wound, the cradle immediately was forced against the housing, thereby presenting the possibility of pinching any fingers that were within the housing. Since all of the elements which are directly controlled by the spring are maintained within bottom housing 20, which is rigidly mounted in place, there is no danger of injury at the time the spring is wound.

After the spring is wound, hanger bar arm 94 will be in the position shown in FIG. 3. During the operation of the swing, hanger bar arms 94 and 96 will reciprocate in the form of a pendulum, as shown by arrow 140 in

FIGS. 3 and 4. The reciprocation of the hanger bar arms will in turn reciprocate the swing seat **16** holding the baby.

After the spring has been wound, the swing action is initiated by pushing the hanger bar in a clockwise direction, as viewed in FIG. 3. Referring now to FIG. 6, the action of the hanger bar when pushed forward is seen. Thus, during the forward motion, flange **118** of pawl **114** engages arm **136** of spring **130**. This depresses the arm **136**, and at the same time the arm rotates pawl **114** in a clockwise direction around rivet **117** thereby engaging the flange in a ratchet tooth **68**. At the same time, flange **128** of pawl **122** is rotated out of engagement with a ratchet tooth **68**. With the pawl **122** removed from the ratchet wheel, the tension on spring **82** causes the ratchet wheel to rotate in a counter-clockwise direction. This in turn pushes arm **94** in a counterclockwise direction by the pressure of the ratchet tooth again pawl **114**. Accordingly, pawl **114** is moved to the position shown at **114'** in FIG. 6.

As the arm **94** is moved in a counterclockwise direction the pressure against spring arm **136** is removed, and flange **128** will re-engage a ratchet tooth **68**. The pressure of the spring against pawl **114** is sufficient to swing arm **94** to the position shown in FIG. 5. Since the swing seat **16** depends from the hanger bar **90**, the swing seat will be carried backward along with the arm **94** and the remainder of the hanger bar **90**.

On the counterclockwise swing of arm **94**, pawl **114** is completely free of racket teeth **68**. This is because the pawl is freely pivotable on arm **94** around rivet **117**, and gravity will hold the pawl **114** in the position shown in FIG. 5 against outstruck tab **120**. Accordingly, it is unnecessary to have any spring tension on the pawl **114** as would be necessary when utilizing the prior art structures.

After the spring force has carried the hanger bar to the position shown in FIG. 5, the force of gravity will rotate the hanger bar in the opposite direction. On the return movement, pawl **114** will again engage spring arm **136** thereby freeing flange **128** from a ratchet tooth and engaging flange **118** in a new ratchet tooth. The arm **94** will again be returned to the position shown in FIG. 5 in the manner described above, thereby swinging seat **16** in a counterclockwise direction.

During one full reciprocation of arm **94**, the ratchet wheel **66** will be advanced a rotational amount equal to one ratchet tooth. Thus, each time pawl **122** is removed from the ratchet wheel, it is returned to the next successive ratchet tooth. This controlled escapement of the tension on spring **82** permits the swing to be used for periods of time of approximately fifteen minutes each time the spring is wound.

In the showing of the escapement mechanism in FIGS. 5 and 6, foam **138** has not been shown. It has been left out for the purpose of clarity in explaining the escapement mechanism. However, it should be understood, that in the complete swing the foam should be used in order to deaden the noise accompanied by the winding and unwinding of the ratchet wheel **66**.

Without further elaboration, the foregoing will so fully illustrate my invention that others may, by applying current or future knowledge, adopt the same for use under various conditions of service.

What is claimed as the invention is:

1. A child's swing comprising a frame, a rod rotatably mounted in said frame, a ratchet wheel secured to said rod, a coil spring surrounding said rod, said coil spring being adapted to urge said ratchet wheel in a rotational direction, said coil spring having one end secured to said frame and the other end operatively secured to said ratchet wheel, a hanger bar suspended from said rod, said hanger bar comprising a horizontal bar and two legs projecting vertically therefrom and integral therewith, each of said legs having a hole adjacent its top, said rod passing through the holes to suspend the hanger bar therefrom, said hanger bar being freely suspended from and rotatable about said rod, a seat suspended from said hanger bar, said hanger bar having a first pawl pivotally mounted thereon, a second pawl pivotally mounted on said frame, said second pawl being urged into contact with said ratchet wheel by spring means, means urging said second pawl out of contact wiith said ratchet wheel when said first pawl contacts said spring means, with said first pawl being engaged by said ratchet wheel when said second pawl is urged out of engagement with said ratchet wheel, and said second pawl being returned to engagement with said ratchet wheel when said first pawl is urged out of engagement with said ratchet wheel by the power furnished by said coil spring, thereby pivoting said hanger bar on said rod.

2. The child's swing of claim **1** and further including a tube positioned between said rod and said coil spring.

3. The child's swing of claim **1** and further including means for winding said coil spring, thereby increasing the rotational force on said ratchet wheel, with said coil spring being unwound by the alternate engagement of said first pawl and said second pawl with said ratchet wheel.

4. The child's swing of claim **3** wherein said means for winding said coil spring comprises a crank arm on said rod.

5. The child's swing of claim **1** wherein said first pawl is freely pivotally mounted on said hanger bar, said hanger bar having means thereon to maintain said first pawl in a substantially horizontal plane during the movement of said hanger bar.

6. The child's swing of claim **1** wherein said spring means comprises a hairspring having an arm associated with said second pawl, said first pawl contacting said arm to move said second pawl out of contact with said ratchet wheel, with said arm urging said first pawl into contact with said ratchet wheel when said second pawl is moved out of contact with said ratchet wheel.

7. The child's swing of claim **1** wherein said frame includes a housing having an upper section and a lower section, said lower section being rigidly secured on said upper section, with said ratchet wheel, pawls and coil spring being mounted in said housing.

8. The child's swing of claim **7** wherein said lower section includes at least one slot therein, said hanger bar being reciprocable within said slot.

9. The child's swing of claim **1** and further including legs pivotally mounted to said frame, said legs adapted to support said frame and the seat suspended therefrom.

References Cited

UNITED STATES PATENTS

3,071,339	1/1963	Saint	272—85
3,526,400	9/1970	Carpenter et al.	272—86
3,138,380	6/1964	Satchell et al.	273—82
3,459,423	8/1969	Meade	272—86

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