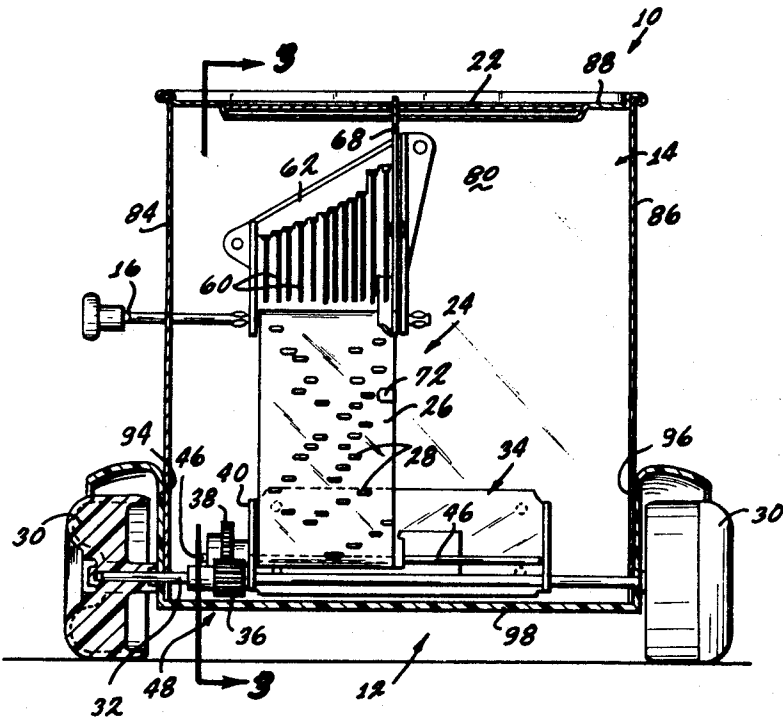


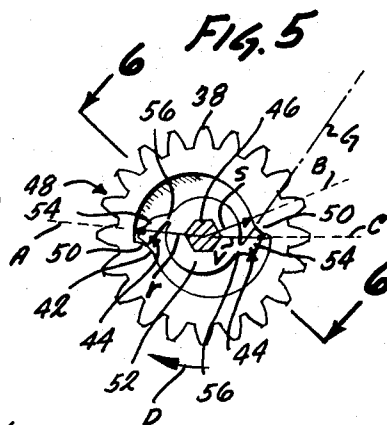
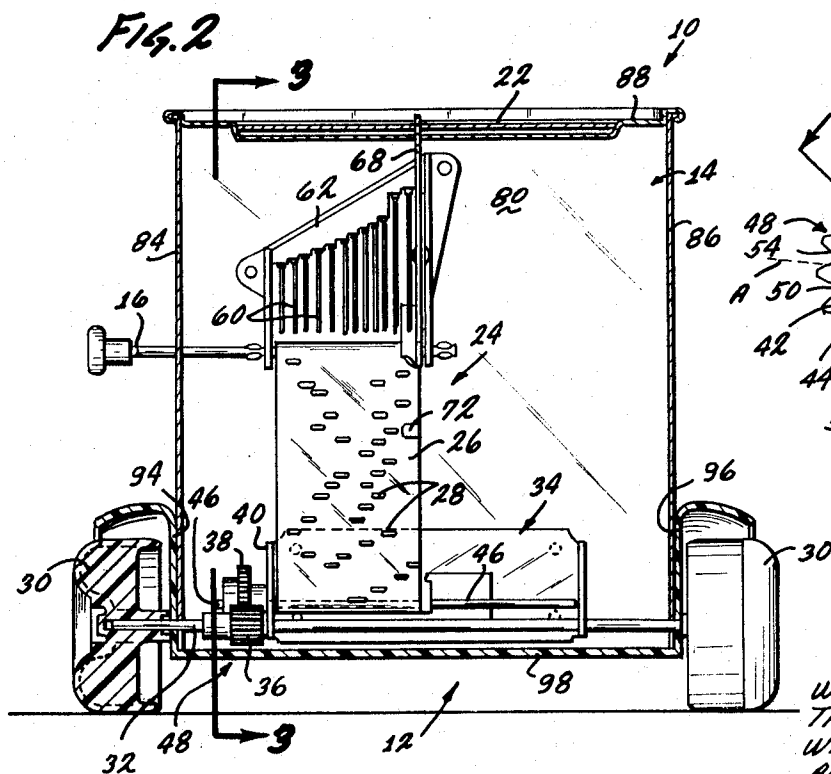
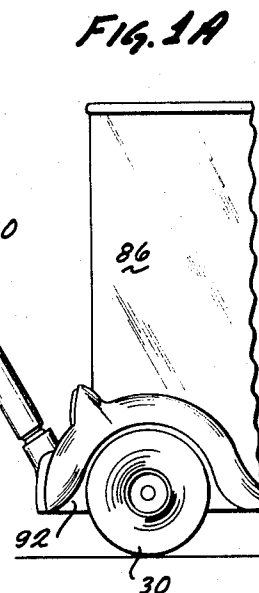
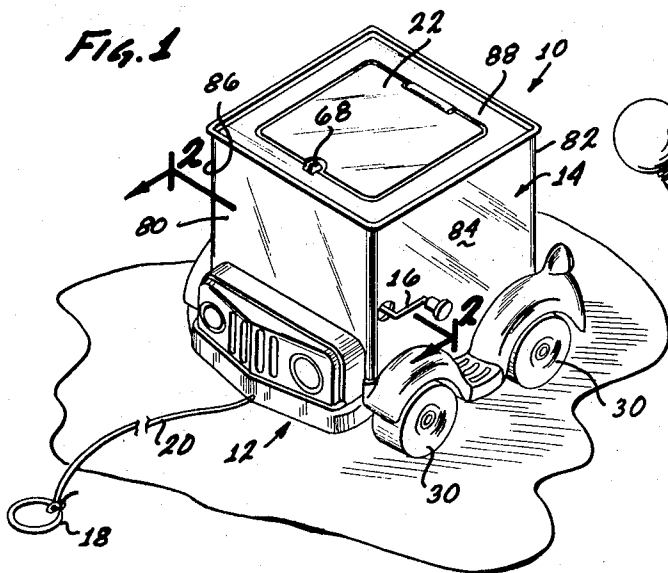
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[21] Appl. No. 12,946
[22] Filed Feb. 20, 1970
[45] Patented Dec. 28, 1971
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[54] PULL TOY
5 Claims, 9 Drawing Figs.
[52] U.S. Cl. 46/111
[51] Int. Cl. A63h 5/00
[50] Field of Search 46/111,
112, 117, 118, 146, 145

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ABSTRACT: A musical jack-in-the-box toy which can be operated by pulling it along the ground or by turning a handle, comprising a sheet metal box on a molded plastic carriage. The carriage has walls that form a recess for receiving the sheet metal box, while the box has sidewalls but no bottom wall. In order to prevent inward buckling of the box sidewalls, a bottom wall of the carriage has pins to push the box walls outwardly against the carriage sidewalls. A clutch for coupling the carriage wheels to the music mechanism includes an integral pawl member with a hub and pawls joined by a thin section of material which acts as a hinge.





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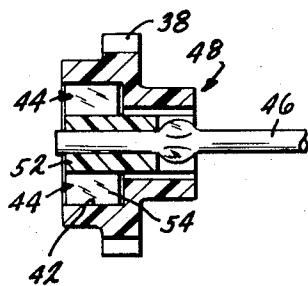
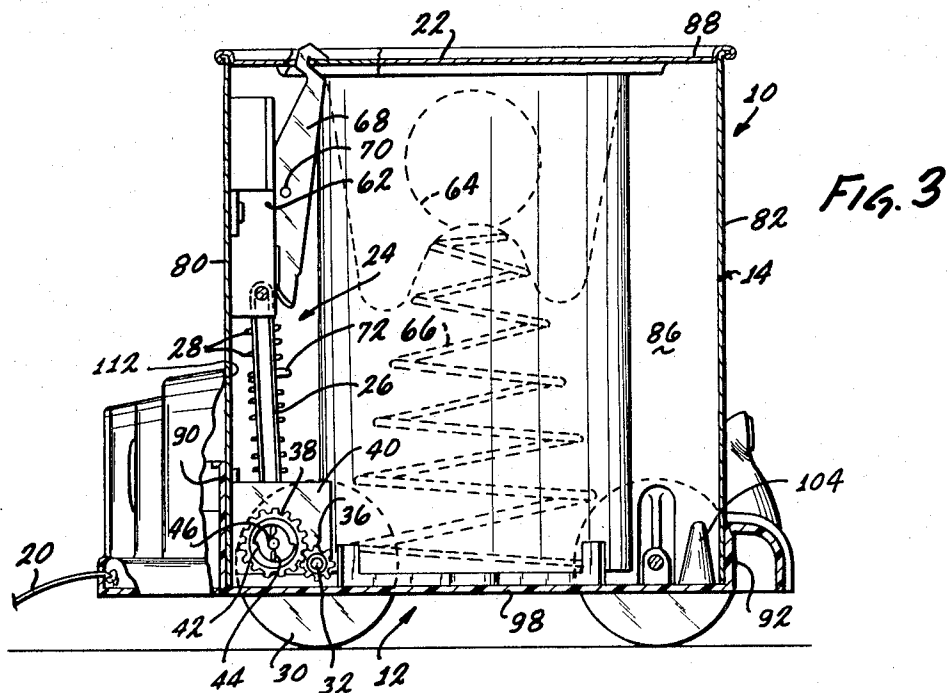


FIG. 6

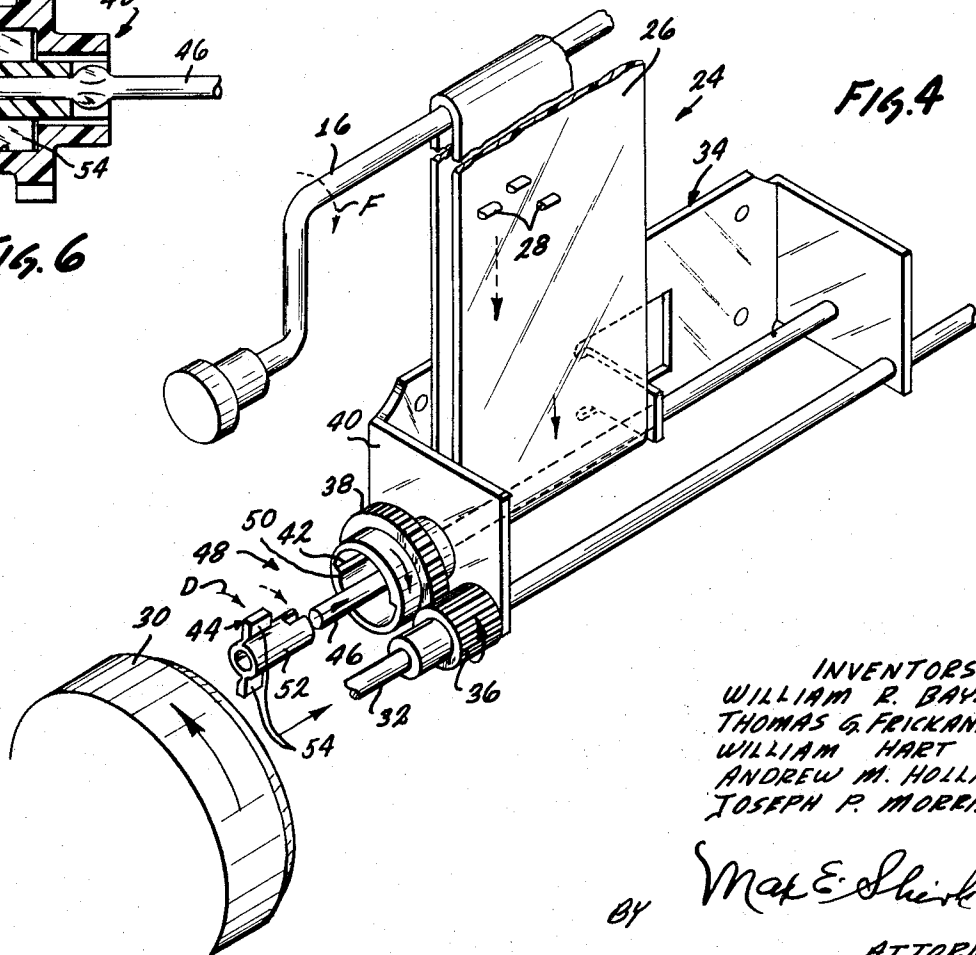


FIG. 4

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FIG. 7

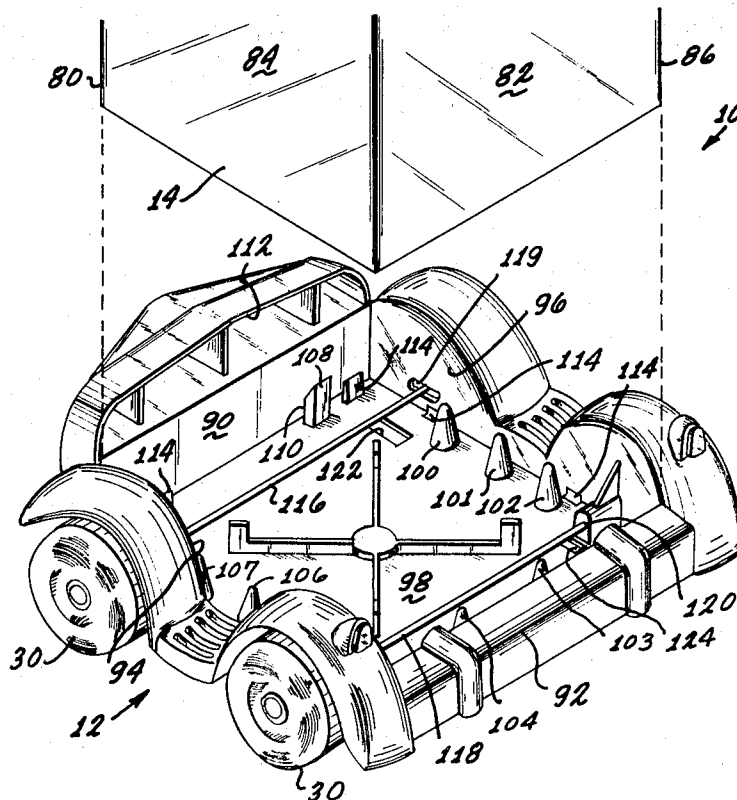
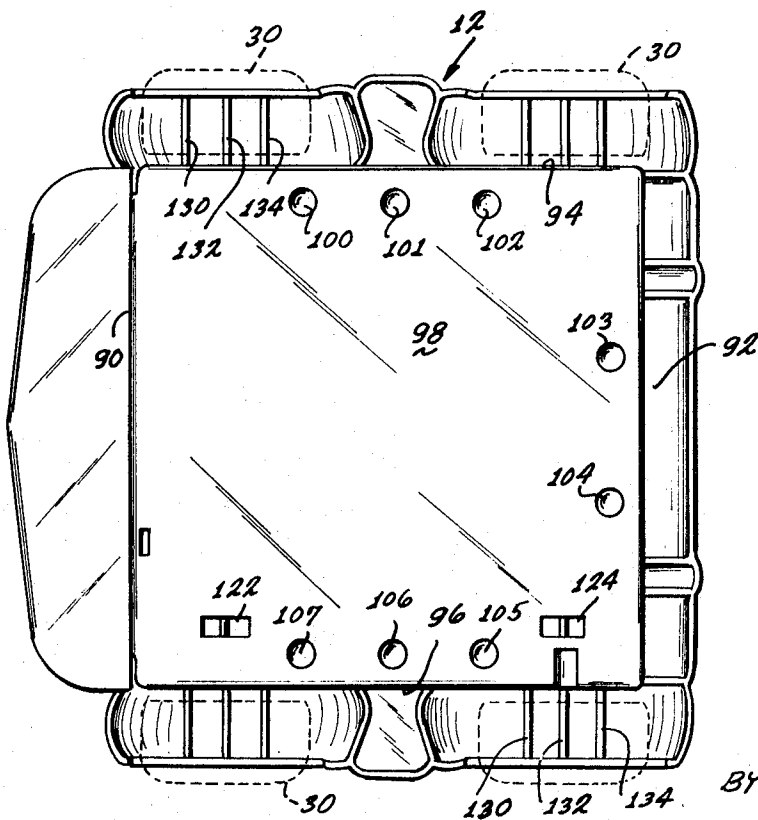


FIG. 8



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PULL TOY

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to toys that can be moved along the ground.

2. Description of the Prior Art

Small children find pull toys, of the type which can be pulled by a string to play a music box or perform animations, highly entertaining. The carriage and wheels for such pull toys can be economically and attractively produced by injection molding processes. However, the musical or animating mechanisms often are best produced using sheet metal housings. In the case of musical mechanisms, the sheet metal housings often provide a resonant effect for amplifying the sound, that plastics cannot readily provide. An attractive way of assembling a sheet metal box on a plastic carriage is to provide the carriage with walls that form a recess into which the lower end of the metal box is received. The box preferably completely fills the recess so that its walls abut the walls of the carriage. However, if the box is made slightly too large, it generally happens that its sheet metal walls buckle inwardly, creating a shoddy effect. Where the front wall of the carriage is higher than the other walls, and is highly decorated, it is especially important that the front wall of the sheet metal box lie adjacent to the carriage wall to prevent a substantial space from showing between them.

OBJECTS AND SUMMARY OF THE INVENTION

An object of the present invention is to provide a pull toy with a plastic carriage and mechanism housing of sheet metal, which is economical to construct and of attractive appearance.

Another object is to provide a musical pull toy which can be obtained by pulling the toy or by turning a handle.

In accordance with one embodiment of the present invention, a pull toy is provided which has a molded carriage and a sheet metal box that fits into the carriage in a snug and attractive manner. The carriage has end walls, sidewalls, and a bottom wall that form a recess. The box has four sheet metal walls and an open bottom, and it fits into the recess in the carriage. The bottom wall of the carriage has pins closely spaced from the end and sidewalls to guide the sheet metal walls of the box into place and prevent them from buckling inwardly. The pins on the side and rear wall of the carriage are conically shaped to guide the corresponding box walls into place. However, the pin adjacent to the front carriage wall has a straight forward surface that not only prevents the bottom of the forward box wall from buckling inwardly, but also assures that the higher portions of the front box wall will be pushed against the front wall of the carriage to prevent an unsightly gap from appearing between them.

The bottom wall of the carriage substantially completely covers the region between the side and end walls, to leave little space for lint to pass into the mechanism within the sheet metal box when the toy is rolled on a carpet. The carriage is supported by a pair of shafts that project laterally through the carriage above the bottom wall. The projection of the shaft through the carriage is made easier by leaving small holes in the bottom wall near one side of the carriage, which the assembler can peer through in projecting the shaft through a side carriage wall. In order to reduce damage to the carriage when a child sits on the box or carriage, fenders are provided which bottom on the carriage-supporting wheels when the carriage is pushed down. The fenders are molded integrally with the rest of the carriage, and a thin plastic fender could not withstand the large bending forces. To strengthen the fender, several vertically extending ribs are provided under them, the ribs contacting the wheels when the carriage is pushed down, and the ribs directly transferring the bottoming forces to the sidewalls of the carriage.

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The pull toy has a musical device and popup puppet which are designed to be operated either by pulling the carriage along the ground or by turning a handle on the box. Simple gear mechanisms connect one of the wheel-supporting shafts and the handle to the musical device to drive it. In order to allow the carriage to remain stationary while the handle is being turned, when a child wishes to turn the handle instead of pulling the toy, a clutch is provided. The clutch is formed by a ratchet member coupled to the wheels and a pawl member coupled to the music device. The pawl member is constructed of polypropylene material and includes a hub and a pair of pawl portions integral with the hub and connected together by a narrow hinge portion which serves as a "living hinge."

The novel features of the invention are set forth with particularity in the appended claims. The invention will be best understood from the following description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a pull toy constructed in accordance with the invention;

FIG. 1A is a partial side elevation view of a pull toy constructed in accordance with another embodiment of the invention, wherein a push handle is provided instead of a pull string;

FIG. 2 is a view taken on the line 2—2 of FIG. 1;

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

FIG. 4 is a partial perspective view of the driving mechanism of the music box of FIG. 1;

FIG. 5 is a partial view showing the clutch mechanism of the pull toy of FIG. 1;

FIG. 6 is a sectional view taken on the line 6—6 of FIG. 5;

FIG. 7 is a perspective view of the carriage portion of the pull toy of FIG. 1; and

FIG. 8 is a bottom view of the carriage of FIG. 7.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 illustrates a musical pull toy 10 which includes a carriage 12, and a box 14 mounted on the carriage and containing a musical jack-in-the-box mechanism. A child can operate the mechanism by turning a handle 16 on the box, or by pulling the carriage along the ground by grasping a pull ring 18 attached to a string 20 that is connected to the front of the carriage. When the mechanism is operated, a tune is played and a cover 22 opens at the end of the tune to release a puppet.

FIG. 4 illustrates most of the musical mechanism 24 which can be operated by turning the handle 16 or rolling the carriage along the ground. When the handle 16 is turned in the forward direction of arrow F, it moves a belt 26 around a loop. The belt 26 has projections 28 thereon which can pluck the tines of a music box comb, to make the tines vibrate and create tones. The belt projections 28 are formed on the belt so as to produce a particular tune, such as a nursery rhyme tune. When the mechanism is operated by rolling the carriage along the ground, the mechanism is powered by rotation of wheels 30 that support the carriage on the ground. The wheels at the front of the vehicle are fixed to a forward shaft 32 that is rotatably mounted on a bracket 34 which is fixed to the mechanism box. A pinion 36 which is fixed to the shaft 32, turns a gear 38 that is rotatably mounted on a flange 40 of the bracket 34. The gear 38 has a ratchet wheel portion 42 on its inner surface, which turns a pawl member 44 (the pawl member 44 is within the ratchet wheel portion 42, but is shown spaced therefrom for clarity of illustration). The pawl member 44 is fixed to a second shaft 46 that is rotatably mounted on the bracket 34. The belt 26 extends around the second shaft 46 so that as the second shaft 46 turns, the belt moves in its loop path to play the tune. It may be noted that when the carriage is pulled along the ground to operate the mechanism 24, the handle 16 automatically turns.

When it is desired to operate the mechanism by directly turning the handle 16, then the wheels 30 should be disengaged from the mechanism 24, so that they do not have to be

turned and the entire apparatus does not have to be moved along the ground by the child turning the handle 16. The decoupling of the wheels 30 from the mechanism 24 when the handle is being turned, is accomplished by the clutch 48 formed by the ratchet wheel portion 42 of the gear 38 and by the pawl member 44. The ratchet wheel portion and pawl member are formed so that the ratchet wheel portion can turn the pawl member when the gear 38 is being driven in the direction of arrow D, which occurs when the toy is being pulled along the ground. However, the pawl member 44 cannot supply substantial torque to the ratchet wheel portion 42 when the pawl member is turning in the direction of arrow D, which occurs when the handle 16 is being directly turned while the vehicle is not being pulled along the ground. The entire ratchet wheel portion 42 and gear 38 may be referred to as a ratchet wheel with a gear thereon or as a member with a ratchet wheel portion and gear portion.

FIGS. 5 and 6 illustrate details of the clutch 48 formed by the ratchet wheel portion 42 and pawl member 44. The ratchet wheel portion 42 includes a pair of ledges 50. The pawl member 44 includes a hub 52 fixed to the second shaft 46 and a pair of pawls 54 which are integral with the hub 52 and which are connected thereto by narrow hinges 56. The pawl member 44 is constructed of a polypropylene plastic material, which is characterized by the fact that a narrow region thereof serves as a hinge which can be bent back and forth many times without breaking. Accordingly, the narrow hinges 56, which are integral with the pawls 54 and hub 52, serve as live hinges that allow the pawls 54 to be pivoted.

The polypropylene material of the pawl member has substantial resiliency and is originally molded with the pawls 54 extending in a radial direction. Accordingly, when the hinges 56 are bent about 90° until the pawls extend circumferentially, as shown in FIG. 5, the hinges resiliently urge the pawls outwardly against the walls of the ratchet wheel portion 42. As a result, the pawls 54 spring out to contact the ledges 50 of the ratchet wheel portion.

The ledges 50 and outer end of pawls 54 face perpendicular to an imaginary line, such as line G that passes through the hinge 56. When the pawl member 44 moves in a direction opposite to arrow D, the ledges 50 do not tend to bend the pawls 54 about their hinges 56, and the pawls do not pivot. Accordingly, the ledges 50 can stop the pawl member from turning relative to the ratchet wheel and the clutch is engaged. On the other hand, when the pawl member moves in the direction of arrow D, the walls of the ratchet wheel 42 exert a movement to bend the pawls about the hinges 56, and the clutch is disengaged. This allows a child to turn the handle 16 to operate the music mechanism without turning the wheels 30. The use of the live hinges as the only flexing area of the pawl member allows it to be constructed simply and with a minimum of material, as compared to a design which might require long flexible arms to serve as pawls.

The internal surface of the ratchet wheel portion 42 is formed so that the radius from its axis of rotation gradually decreases from the distance r at angular position A to distance s at position B, then rapidly increases to distance v at position C, and then repeating. The pawl member is formed with the pawls 54 of a length which requires them to be bent (about the hinges 56) until they extend substantially tangentially to the hub, in order to fit within a circle of radius r .

FIGS. 2 and 3 illustrate some further details of the mechanism 24 which produces a tune and releases a pop-up puppet. The tune is produced by the tines 60 of the comb 62, the tines extending to a position in the path of the projections 28 of the belt 26. A puppet 64 which can jump out of the box 14 is upwardly biased by a spring 66. The cover 22 which can release the puppet, is held closed by a latch 68 that is pivotally mounted on a shaft 70, and biased towards a position to retain the cover 22 closed. However, a latch-releasing projection 72 on the belt can push on one end of the latch 68 to pivot it to release the cover 22. The projection 72 moves to a position to operate the latch as the last note of the tune defined by the belt, is played.

The box 14 which holds the music and pop-up apparatus is formed by a pair of end walls including a front wall 80 and a rear wall 82, and a pair of sidewalls 84 and 86. The top of the box is covered by a top wall 88 which has an opening that can be covered by the cover 22. The bottom of the box is open. The carriage 12, best shown in FIG. 7, includes a front end wall 90, rear end wall 92, left sidewall 94, right sidewall 96, and bottom wall 98. These five walls 90-98 form a recess which receives the lower end of the box 14. The carriage 12 can be constructed by injection molding of plastic. The box 14, however, is formed by thin sheet metal which is resonant and amplifies sound created by the music box mechanism.

The carriage 12 is constructed to receive the box 14 in a manner that allows rapid assembly and which assures a finished toy of neat and attractive appearance. In order for the toy to appear neat, the outer faces of the box sidewalls 80, 82, 84 and 86 should lie substantially against the walls 90, 92, 94 and 96 of the carriage. However, such a close fit should be accomplished without inward buckling of the sheet metal walls of the box, since such buckling can create a shoddy appearance. The abutting of the sheet metal walls with the walls of the carriage is especially important at the forward wall 90, since this wall is higher than the others, and is highly decorated so that it is more apparent than the other walls.

In order to facilitate rapid and neat assembly of the box 14 in the recess formed in the carriage, several pins or supporting member 100-109 are formed in the bottom wall 98 of the carriage at positions spaced a small distance from the walls 90, 92, 94 and 96 of the carriage. The pins abut the lower edges of the sidewalls of the box 14 to prevent them from buckling inwardly, as well as guiding the lower edge of the box into place. It may be noted that the pins 100-106 are cone-shaped, and their lower ends are spaced from their respective walls of the carriage 92, 94 and 96, by a distance approximately equal to the thickness of sheet metal of a box wall. The pin 107 which is disposed opposite the front carriage wall 90, however, has a straight, forward side 110. The straight side 110 of pin 107 abuts the inner face of the box forward wall 80 at at least two locations vertically spaced from each other. This assures that upper regions of the forward box wall 80 cannot be deflected backwardly where they might leave a gap between the forward wall 80 and the top region 112 of the forward carriage wall.

In assembling the box 14 in the carriage 12, the box is preferably tipped so that only the forward wall 80 of the box enters between its pin 107 and forward wall 90 of the carriage. The rearward end of the box is then pivoted down so that the entire lower edge of the box seats in the carriage. As the box becomes fully seated in the carriage, the pins prevent any of the box walls from buckling substantially inwardly. Additional support members 114 are spaced around the carriage to hold all portions of the box walls against inward buckling after the box is fully installed in the carriage.

After the box is installed, it is possible for some inward wall deflections to occur when a large weight is placed on the box. Any tendency of the front box wall 80 to buckle inwardly is resisted by the bracket 34 on which the front wheel shaft 32 is mounted. As shown in FIG. 3, the bracket 34 is joined to the rear face of the front wall 80. The weight force transmitted through the bracket 34 causes it to bend the front box wall 80 outwardly, so it abuts the top region 112 of the carriage.

The assembly of the pull toy 10 generally involves installing the box 14 with the mechanism 24 therein in the carriage, and then projecting a pair of shafts 116, 118 laterally through the carriage with the box already in place thereon. Prior to installation of the shafts 116, 118, each shaft has a wheel 30 fixed to one end, while to opposite end of the shaft has no wheel thereon. After each shaft is fully installed, the other wheel is fastened to the other end of the shaft. The projection of the shaft through the carriage can be a difficult operation. The initial projection of a shaft 116 or 118 through one carriage wall 94 is easily accomplished, but the projection of the shaft through a small shaft-receiving hole 119 or 120 near the opposite side of the carriage is difficult to accomplish, since the person performing the assembling cannot see the end of the

shaft which he is trying to fit into the hole 119 or 120. The holes 119 and 120 cannot be readily seen because the lower wall 98 of the carriage is constructed to substantially completely cover the bottom of the carriage to prevent lint from a rug on which the pull toy moves, from jamming the music box mechanism.

In accordance with the present invention, a pair of holes 122 and 124 are provided in the lower wall 98 of the carriage to aid in assembling. The holes 122, 124 are located near one sidewall 96 of the carriage, so that a worker can peer through the holes to view the end of the shaft which he is trying to fit through a small hole. It may be noted that in assembling the rear shaft 118, it is only necessary to insert the shaft through the hole 120 near the side 96 of the carriage. However, the end of the forward shaft 116 must also be inserted through a small hole in the bracket 34 (on which the clutch parts, described above, are mounted) as well as through the hole 119 in the sidewall 96.

The wheels 30 which are fixed to the ends of the shaft 116, 118 can be readily made strong enough to support the weight of a child, who may sit on top of the box 14 of the toy. However, the cantilevered ends of the shaft might break the sidewalls of the carriage. To prevent such breakage, and to improve the appearance of the pull toy, fenders 126 are formed in the sidewalls over the wheels 30. When a child sits on the toy and the axles 116, 118 bend slightly, the wheels could bottom on the fenders 126 so that the weight of the child is transmitted through the sidewalls of the carriage and through the fenders directly to the wheels. However, if the fenders were merely constructed as thin sheet portions of plastic extending from the sidewalls, they could not withstand the large forces which could be transmitted through them between the wheels and sidewalls of the carriage. To permit such weight transfer, three ribs 130, 132 and 134 are located in each fender, each rib extending vertically between the fender and a position spaced slightly above the top of a wheel 30. When the carriage is deflected downwardly a small amount such as one-sixteenth inch, each wheel simultaneously bottoms on all three ribs 130, 132 and 134, which transmits forces directly between the sidewalls of the carriage and the wheels. The large vertical height of the ribs allows them to withstand substantial bending moments so that thin ribs, which can be readily molded, can be used.

Thus, the invention provides a pull toy with a music device which can be operated by pulling the toy along the ground through a pull string or by turning a handle. Instead of using a pull string, a pusher rod can be used, such as is shown at 140 in FIG. 1A, to push against the rear wall 92 of the carriage. The operation of the mechanism by turning the handle 16 thereon is made easy by reason of the clutch which decouples the mechanism from the wheels when only the handle is being turned. The clutch apparatus which is utilized is extremely simple, so that the cost and price of the toy is held to a minimum. The toy utilizes a plastic carriage and sheet metal box thereon, which are assembled in an easy manner that prevents buckling of the sheet metal box that could cause an unsightly appearance. The carriage is also constructed to eliminate lint from the music box mechanism, while facilitating assembly of the shafts through the toy. The carriage on which the toy moves is designed for extreme ruggedness, and can withstand the weight of a child thereon.

Although particular embodiments of the invention have been described and illustrated herein, it is recognized that modifications and variations may readily occur to those skilled in the art and, consequently, it is intended that the claims be interpreted to cover such modifications and equivalents.

1. A pull toy comprising:

a carriage having forward and rearward ends, said carriage

having wheels for supporting it on the ground;
a pull string attached to said carriage to move it in a forward direction;

a music device mounted on said carriage for operation in a predetermined direction to play music;

a handle mounted on said music device for operating it; and
a directional clutch for coupling said wheels to said music device to drive it when said wheels are rolling forward and to decouple said wheels from said music device when said music device is driven in said predetermined direction by direct rotation of said handle.

2. The pull toy described in claim 1 wherein:

said clutch comprises a first member with internal ratchets and a second member rotatably mounted within said first member, said second member constructed of polypropylene material and having a hub and a plurality of pawl members radiating from said hub and integral therewith, said pawl members having radially inner ends which are narrowed into a living hinge coupling them to said hub.

3. A clutch for toy mechanisms comprising:

a pawl member having a hub, a plurality of pawls, and a hinge portion integral with said hub and pawls for connecting them, said pawl member constructed of at least partially resilient material and each of said pawls being at least several times thicker than each of said hinge portions so that said pawls pivot substantially only about said hinge portions; and

a ratchet wheel with an internal ratchet surface extending around said pawl member, said internal surface of a size to maintain said pawls extending primarily tangentially to said hub, and said internal surface having ledges oriented to urge a pawl in a direction substantially in line with its hinge portion when said pawl member and ratchet wheel are urged to rotate in a first predetermined direction relative to each other.

4. The clutch described in claim 3 wherein:

said pawl member and ratchet wheel are mounted for rotation about the same axis of rotation;

said internal surface of said ratchet wheel varies in radial distance from said axis of rotation as a function of angular position, so that said radial distance decreases gradually with change of angular position from a first angular position to a second angular position, then increases rapidly from said second angular position to a third angular position, then decreases gradually from said third angular position to a fourth angular position, and then increases rapidly; and

said pawl member is formed with said pawls of a length which requires them to be bent about said hinges until they extend substantially tangentially to said hub in order to fit within a circle of a radius equal to the radius of said internal surface of said ratchet wheel at said first angular position thereof.

5. A wheeled toy comprising:

a wheeled carriage having means for moving the same along a supporting surface;

a music device on said carriage for operation in a predetermined direction to play music;

a handle on said music device for operating it; and

a one-way clutch drivingly connecting at least one of said wheels to said music device to operate the same in said predetermined direction when said carriage moves along said surface in one direction, said one-way clutch serving to decouple said music device from said wheel when said music device is driven in said predetermined direction by said handle.

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