March 3, 1970 W. M. LAKIN 3,498,603

CARROUSEL TYPE MOTION TOY

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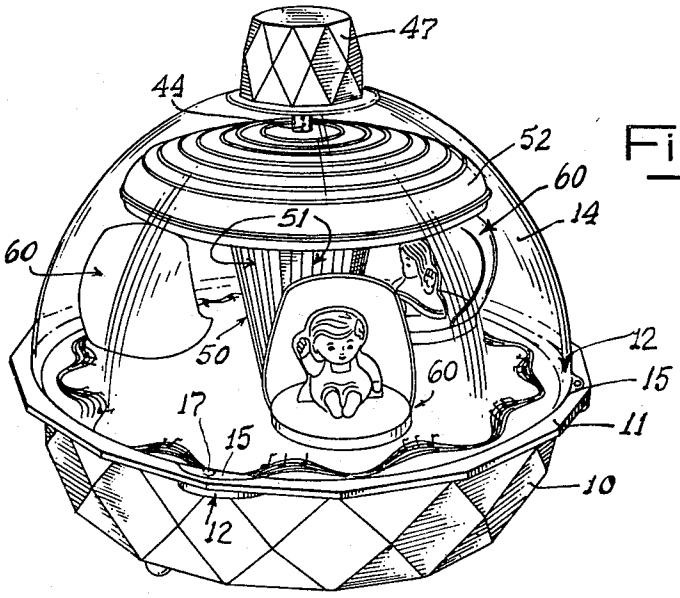


Fig. 1.

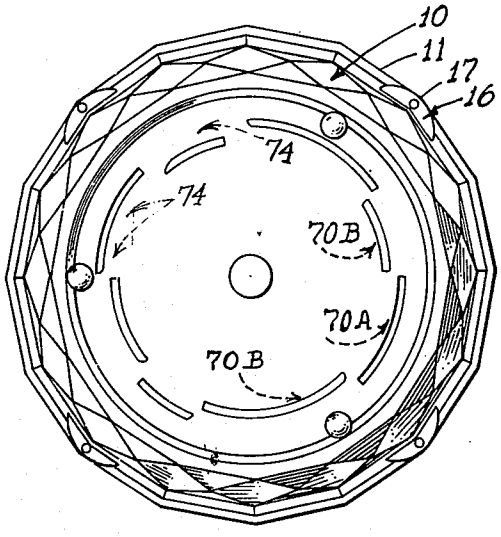


Fig. 2.

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Fig. 3.

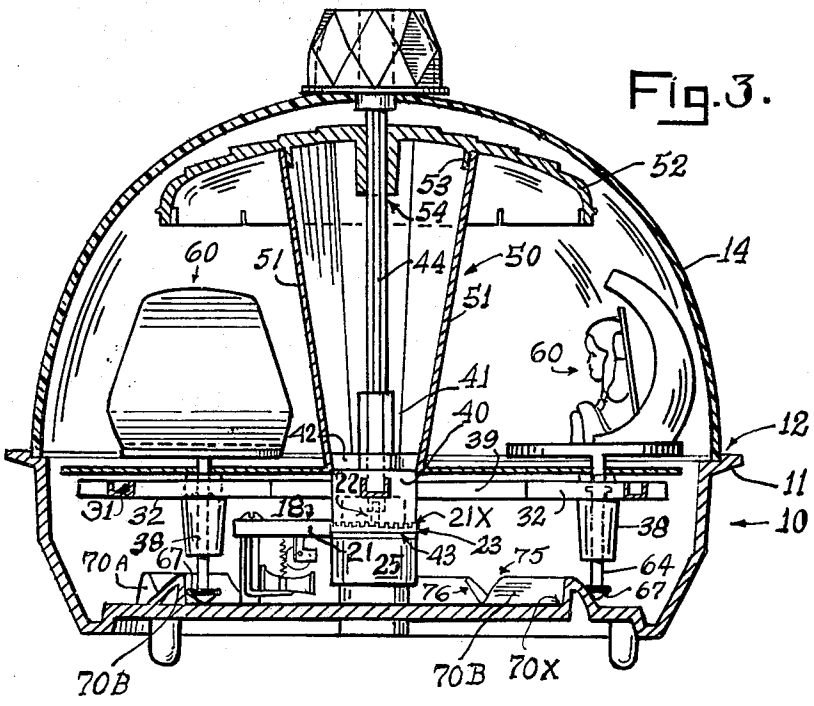
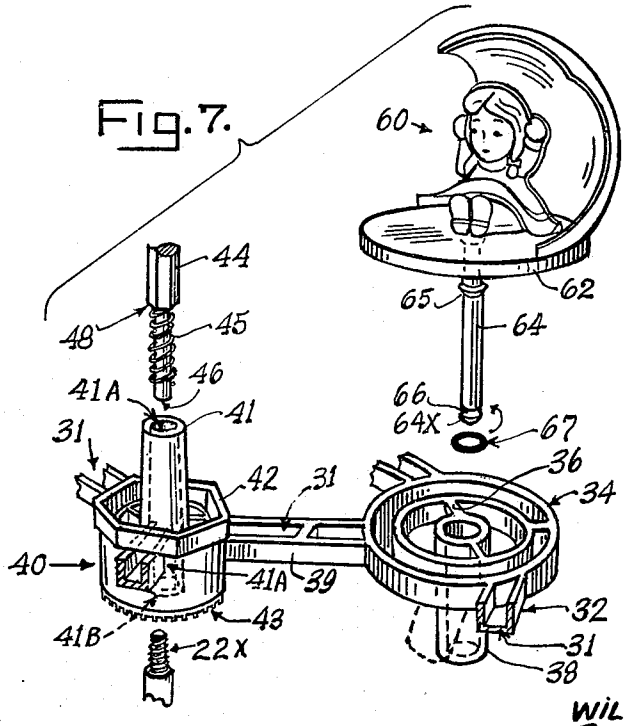


Fig. 7.



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Fig. 4

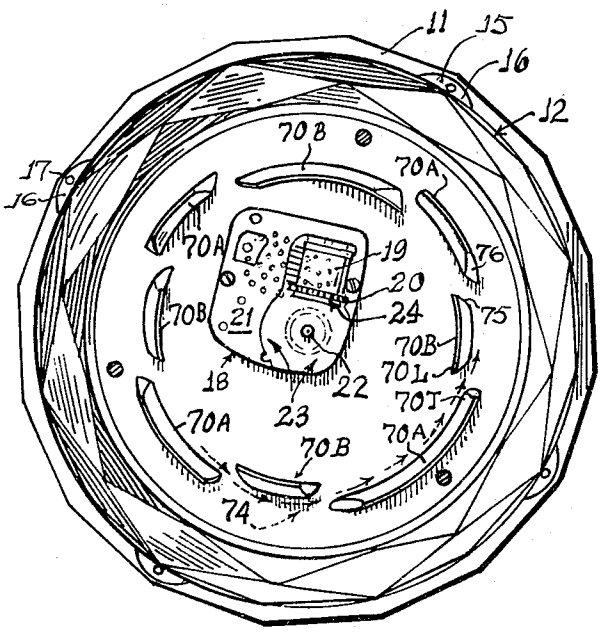


Fig. 5.

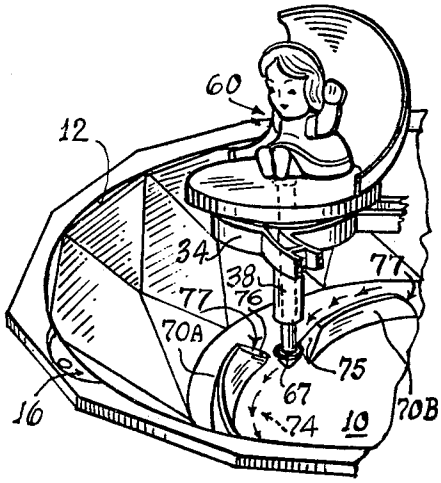


Fig. 6.

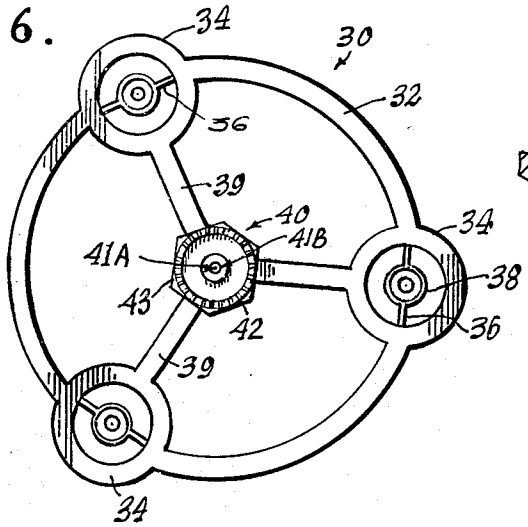
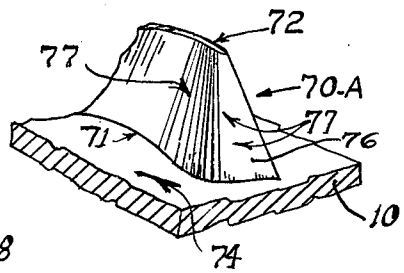


Fig. 5-A.



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3,498,603

CARROUSEL TYPE MOTION TOY

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Int. Cl. A63h *13/20*
U.S. Cl. 272—31 13 Claims

ABSTRACT OF THE DISCLOSURE

The subject matter relates to carrousel and roundabout toys and the like having a rotating platform with individual motion objects carried thereon and motivated by corresponding spindle means having rollers driven by frictional engagement with stationary arcuate surfaces beneath the platform, the disclosures providing a novel platform or carrier structure molded in one piece to include an integrated central driving gear and platform structure with radially-located, rockable bearings for the shafts, and stationary roller drive formations of ridge-like character formed as an integral part of a support and so situated and constructed as to impart either unidirectional or intermittently reversing action to the individual motion objects.

The improvements disclosed and claimed relate to a motion toy of the roundabout and carrousel type including a rotatable platform or carrier which may be driven by power taken from the windup motor of a music box.

Individual motion elements or figurines of desired configuration are mounted on the rotatable platform and are themselves rotatable or pivotable about individual axes.

One of the important features of novelty is the means for mounting the individual motion elements for pivotal motion whereby corresponding spindles thereof are rockable laterally and shiftable longitudinally or axially as an adjunct to individual drive means deriving power from the rotation of the carrier, wherein the spindles depend below the surface of the carrier platform and are equipped with roller means adapted to travel through a circular path and run along the arcuately extensive sloping face of a stationary drive formation beneath the carrier;

Wherein these drive formations are in the nature of upstanding arcuate ridges located about the carrier axis and the spindles have tires disposed to run along a sloping side face of these ridges;

Wherein the side faces slope in a way such that the spindle drive means or tires can ride upwardly thereon to automatically adjust to an optimal driving relation therewith by reason of the lateral and axial shiftability of the spindle means;

Wherein the ridges are arranged in sets each lying in concentric circles radially spaced one from another to define between the sets a circular path or alleyway in which the spindle tires travel, the drive ridges in each such circular set being interrupted in alternation so that the spindle tires will first drivingly engage a ridge in one set, and then a ridge in the other set, whereby the spindle means and the appertaining motion elements will be caused to oscillate;

Wherein the carrier is of a unique structural design feasibly moldable in a single integrated unit providing a central drive gear surrounded by a plurality of radially-situated bearing sockets each seating one of the spindles for the axial and lateral adjusting action aforesaid, by reason of which, together with the particular form and location of the stationary drive formations or ridges, the roundabout structure can be economically produced and driven by power taken from a small spring-driven music box motor without unduly loading the latter or interfering with the proper sound and music effects thereof.

Still further aspects of novelty and utility relate to details of the preferred commercial embodiment of the toy more particularly described hereinafter in view of the annexed drawings, in which:

FIGURE 1 is a perspective view of one embodiment of the toy;

FIGURE 2 is a bottom plan view of the same;

FIGURE 3 is a vertical section with parts shown in elevation;

FIGURE 4 is an interior plan view of the base section;

FIGURE 5 is a fragmental perspective enlargement of the interior of the base section, the rotatable carrier, and the oscillatory drive means;

FIGURE 5–A is a magnified perspective fragment of the lead-in configuration on one of the driving ridges;

FIGURE 6 is a bottom plan view of the rotatable carrier;

FIGURE 7 is a fragmental exploded perspective of parts of the carrier and figurine structure.

The embodiments of the toy seen in FIGURE 1 comprises a molded, dish-shaped base section **10** having an upper rim portion provided with a flange **11** having a recessed ledge **12** (FIGURES 3 and 4 also).

An approximately semi-spherical dome **14** of molded transparent, non-shattering plastic has its lower margins seated in the ledge, there being at spaced positions around said margin lateral tabs **15** which fit into recessed seats **16** in the base ledge, FIGURE 4, the dome being secured by rivets **17** through said tabs and rim seats.

Secured on the floor of the base section, FIGURE 4, is a motor means **18** in the preferred form of a wind-up music box of known construction and including particularly a tone drum **19** driven by a coaxial bull gear **20**, the teeth of which are exposed at the upper face of the casting **21** opposite a winding spindle **22** projecting in a vertical plane in the normal position of the device. Circumambient of said spindle is a recess or seat **23** opening sidewise at **24** in juxtaposition with the exposed teeth of the bull gear, it being understood that the usual helical driving spring (not seen) is contained in a shell **25**, FIGURE 3, and tensioned by turning of the spindle **22**, said spring driving a gear system of known arrangement (not seen) having driving engagement with the bull gear to rotate the tone drum in the usual manner.

A figurine carrier **30** of the construction shown in FIGURE 6 is effectively totally supported for rotation in the aforesaid seat **23** in the motor casting **21**. The carrier consists of a main ring **32** provided at equally spaced intervals thereabout with integral secondary rings **34** each interrupting the continuity of the main ring so as to provide a gap, the gap in each secondary ring being spanned by a relatively thin web **36** extending approximately diametrically of the secondary ring and approximately in alignment with the median circumference through the main ring and tending to appear as a continuation or interconnecting web across the said gap. The main and secondary rings are contained in a first plane, which is normal to the axis of rotation of the carrier, as will more fully appear; and each of the diametric webs **36** is substantially flat and contained in a plane at right angles to the plane of the rings.

The carrier is molded from a synthetic plastic material having a degree of flexibility such tht the diametric webs **36** can twist somewhat about the long axis therethrough. Integrally formed with each diametric web **36**, centrally thereof, is a depending tubular bearing or socket member **38**, FIGURE 7 also, which can be rocked laterally somewhat from a normal central position as permitted by the web member of which it is a part.

Disposed centrally of the main ring **32**, and connected to the secondary rings **34** by spokes **39**, is a hub member **40**, FIGURES 6 and 7, having a bored tubular central sleeve formation **41**, a polyhedral upper shoulder **42**, and a ring of gear teeth **43** on the underside or lower axial face thereof, the diametric dimension of the lower portion of said hub including the set of gear teeth being such as to fit freely but closely within the seat **23** in the music box casting, as at **21X** in FIGURE 3, the carrier structure being formed symmetrically so as to have a balance permitting it to stand supported in the music box seat, as aforesaid, in which condition the gear teeth **43** are in driving mesh with the teeth of the bull gear **20**, and since the latter gear is driven by the spring motor of the music box, the carrier hub will be rotated about the windup spindle **22** which stands above the surface of the casting and projects freely somewhat into the bore **41A** of the hub and affords a center about which the carrier turns. The end **41B** of tube **41** extends downwardly toward the floor of the seat **21X**, within the hub, as in FIGURE 7.

The carrier is thus part of a roundabout structure having a hub with gear teeth supported in a seat adjoining a music box bull gear in accordance with disclosures and features claimed in my U.S. Patent No. 3,279,793, there being special features of further novelty in the presently disclosed constructions, as will appear more fully hereinafter.

In order to wind the spring motor, a long knob spindle **44** is passed through an opening at the top of the transparent dome **14**, the lower end portion of said spindle being reduced to accommodate a coil spring **45** and having an internally threaded bore **46** (FIGURE 7) engageable with the threaded end **22X** of the spring wind-up spindle, the long spindle rod being surmounted by a decorative knob **47** at the top of the dome, turning of which winds up the music box motor, the shoulder **48** at the reduced lower end of the rod serving to capture the carrier in its seat, while the spring **45** yieldingly urges the carrier into its seat to maintain the gear teeth in mesh.

In order to make the carrier structure as light in weight as possible while giving it a non-warping rigidity, it is formed mainly in channel shaped cross section, as indicated at positions **31** in FIGURE 7. The winding rod is concealed from view within a tubular central column **50**, FIGURES 1 and 3, of inverted conical configuration with polyhedral sides **51** adapted to interfit and couple with the polyhedral configuration of the shoulder **42** on the carrier. Fitted upon the upper margins of the column is a canopy member **52** having a polyhedral rib formation **53** mating with the like configuration of the column, the canopy further having a central tubular bore **54** freely passing the knob rod. Thus, the circular carrier is rotated by meshing of its gear teeth with the bull gear on the music box, and the canopy structure rotates with the carrier by reason of the polyhedral interfit of the foot of the column with coupling formations on the hub of the carrier.

As seen in FIGURES 1 and 3, a plurality of motion elements or figurines **60** are supported by and move with the carrier, said elements having the detailed construction seen in FIGURE 7 and consisting in a table or platform portion **62**, which is itself a secondary carrier on the main carrier. Each table portion has a depending stem spindle **64** integrally molded therewith and freely fitting into the socket bearing **38** on the carrier, each said stem having near its upper end a bearing collar **65** which enters the bore to space the spindle in said bearing. Close to the lower extremity of each platform or subcarrier spindle **64** is an annular groove **66** adapted to seat an annular friction element or tire **67**, said stem spindle terminating in a chamfered or conical point or tip at **64X** for purposes to appear. The length of each subcarrier spindle **64** is such that it depends beyond the lower extremity of the tubular socket bearing **38**, FIGURE 3, so that it can rise and fall therein in driving coaction with certain drive means to be described.

Means for imparting motion to the individual subcarrier and figurines, as a function of the rotation of the main carrier structure supporting them, comprises the provision, as in FIGURES 4 and 5, of sets of upstanding arcuate ridges **70A** and **70B** formed as an integral part of the base section **10**, said ridges being arranged in inner and outer circles concentric with the center of rotation of the carrier and therefore with the axis through the wind-up spindle **22**.

The ridges **70A** are grouped in the outer circle while the ridges **70B** comprise the inner circle, there being a space (measured along any radius from the center of rotation in spindle **22**) between the inner sides or faces of the outer ridges and the outer faces of the inner set of ridges, this space corresponding to the orbit travelled by the several friction drive elements or tires **67** during rotation of the carrier **30**. As seen in FIGURE 5–A particularly, each ridge formation is wider at its base **71** than at its top **72**, the inner and outer sides or faces thereof tapering upwardly toward a peak, from which it follows that the circular raceway **74** in which the subcarrier tires travel between the circular sets of arcuate ridges, is narrower at the bottom level than toward the upper or peak portions of the ridges flanking and defining said raceway.

FIGURE 5 depicts the disposition of one of the frictional drive elements or tires **67** in the aforesaid raceway between the sets of ridges, the orbit or path of travel of the tires and appertaining subcarrier stem spindle being indicated in dotted lines in both FIGURES 4 and 5. The weight of the individual subcarrier or tables is sufficient to cause the spindle stem to descend to the limit in its socket bearing to the limit permitted by the table members **62**, and this level is such that the tip **64X** of the spindle just clears the floor of the base section while disposing the appertaining drive tires near the narrower lower zone of the raceway so that the tire is positively and firmly in position for driving engagement with the side or face of the ridges in both inner and outer sets at the time of approach to the beginning or leading end of said ridges in a manner sought to be indicated in both FIGURES 3 and 5, the latter view taken with FIGURE 4, also illustrating the fact that the spacing of the terminal portion **75** of a ridge in the inner set with respect to the beginning or leading portion **76** of the adjoining ridges in the outer set is such that the spindle stems can drop to the lowest level in reaching this point so that the appertaining tire will be disposed to engage the next following ridge at the wider part thereof with such degree of firmness that the spindle will tend to be swung sidewise slightly to assure good driving contact, the lateral yieldability of the web portions **36** supporting the spindle bearings **38** in the gap in the several small carrier circles permitting such adjustment.

As the main carrier rotates from a position at which the drive tire **67** on any leg leaves a ridge in one set to engage the next ridge in the other set, as in FIGURE 5 for example, the tire will tend to climb up the face of said next ridge owing to the slope thereof and seek an optimal driving position in which the weight of the subcarrier will maintain it during the advance along said ridge, the spindle or stem members **64** shifting upwardly in their bearing sockets in this automatic level-seeking and drive-adjusting action. To further facilitate a smooth transition of the subcarrier drive means from one ridge to the next, the leading margins of the driving faces of the ridges in each set are relieved as at **77** in FIGURE 5–A to provide a lead-in angle most favorable to establishing immediate driving contact between the advancing tire and at an angle most favorable to produce immediate tendency of the tire to bias upwardly along the side of said ridge in seeking its optimal driving level thereon as aforesaid, so that a smoothly continuous alternation in

the resultant driving force applied to the subcarrier will result.

It will be understood that the driving forces applied to the subcarrier drive means, particularly the tires **67**, as the main carrier structure rotates, act in reverse directions depending upon whether the tire engages a ridge in the inner or outer set, in consequence of which an oscillatory motion is imparted to the subcarrier tables in the case where the ridges in each set occur in sequential alternation, for instance as depicted in FIGURE 4, it being further understood that other arrangements of the ridges are possible to provide different motion effects.

Any suitable configuration may be employed for the figurines **60**, to be carried by the table or platform elements **62**, and the spacing of the subcarriers may be such as to cause them all to move in unison or differently. However, since the power supplied by the conventional music box motor is relatively slight, most satisfactory results are obtained from a symmetrical disposition of the subcarriers and the distribution of mass therein and in the main carrier which will cause the minimal loading on the available power and drive means. In this connection, the self-levelling automatic drive-adjusting action of the subcarriers heretofore described is of utmost importance and serves the further purpose of preventing variations in the rate of rotation of the tone drum of the music box.

In order that the motions of the several figurines may be dependably constant without impairment of the functioning of the music box, the fit of the spindles **64** in their respective socket bearings **38** must be quite free and of a character to inhibit binding. To this end the spindles should be formed with a slight downward draft or taper beginning at the collar **65**, the latter fitting freely down into the socket or bore and serving as an annular spacer bearing to contact the inner wall of the socket bearing somewhat loosely as the major bearing and contact surface which the spindle will have in both rotary and axial motion. By this means the surface area of bearing contact is minimized to reduce frictional loading on the bull gear and music box motor, the axial and lateral degrees of movement of the bearing sockets similarly minimizing the loading effects at the point of driving contact of the spindle tires **67** with the complex angularity of the driving ridges, for reasons previously explained.

I claim:

1. In a roundabout mechanism for action toys and the like, a carrier rotatable about a main axis; means providing a support at one axial end of the carrier and having arranged thereon stationary ridge-like drive formations upstanding toward the carrier and disposed radially of said axis to extend arcuately along substantial portions of a circuitous tracking path thereabout, said formations providing driving faces confronting said path and sloping upwardly away therefrom; bearing means supporting a spindle to shift axially therein with the spindle adapted to be rotatably driven from said stationary formations as a function of rotation of the carrier; means rockably mounting said bearing means on the carrier so that the spindle can rock in a direction laterally of its axis along a radius from the main axis toward and away from said formations, one end region of the spindle toward said support means carrying a driving member for rotative driving engagement with said formations, said spindle normally shifting to a lowered level to dispose the driving member for engagement with a lower level of said driving faces; said mounting means yieldingly biasing said bearing means into a normal position in which said driving member will positively engage said faces at a lower level in approaching the beginning of any such formation responsive to rotation of the carrier, said bias permitting said bearing means and spindle to rock so that said driving member can seek an optimum driving level and maintain a positive driving engagement with said faces during rotation of the carrier; said spindle being adapted to transmit motion to a desired action means moving with the carrier.

2. Mechanism according to claim **1** wherein said ridge-like formations are formed as an integral part of said support means.

3. A construction according to claim **1** wherein the drive formations are situated entirely about said main axis but are interrupted along said path to provide discontinuities of the driving faces to cause intermittent rotative action of the spindle.

4. The construction of claim **3** wherein said ridge-like formations are formed integrally with said support means.

5. A construction according to claim **1** wherein said drive formations are disposed in sequential arcuate lengths along said path with intervening gaps and all faces are located at one particular side of the path of said circuit whereby said spindle tends to be rotated in only one direction responsive to a corresponding unidirectional rotation of the carrier, and such rotation of the spindle is intermittent owing to said gaps.

6. The construction of claim **5** wherein said ridge-like formations are an integral part of the support means.

7. The construction of claim **1** wherein said drive formations are provided in two concentric sets respectively situated on opposite sides of said path and each set comprising sequential driving faces respectively separated by discontinuities at intervals along said path with the driving faces in one set staggered with respect to the driving faces in the opposite set whereby the driving faces in one set terminate at an angular position along said path at which a driving face of the opposite set begins and vice versa, whereby the rotation of the spindle is intermittently reversed as the carrier rotates in a given direction.

8. The construction of claim **7** wherein said ridge-like drive formations and said support means are formed as an integral molded structure.

9. Mechanism according to claim **1** further characterized by the provision of carrier drive means including a windup music box motor secured on said support, said motor having a frame, gear means including a bull gear, spring power means for driving said gear means and including a winding spindle projecting normally from a side of said frame adjacent said bull gear, a seating well formed in said frame circumambient of said windup spindle and having a side opening juxtaposed with said bull gear; said carrier having a central hub at one axial end of which is formed as an integral part thereof a crown gear fitting into said well with gear teeth meshing with said bull gear and riding on a floor portion of the well to provide major support for the carrier.

10. Mechanism according to claim **1** wherein said carrier comprises an outer ring portion and means joining the same to a central hub portion and said bearing means are carried by the outer ring portion at angularly spaced positions thereabout.

11. Mechanism according to claim **1** wherein said carrier comprises a one-piece molded unit including an outer ring portion, a central hub portion joined therewith and having axially-extensive gear teeth formed as an integral part of one axial end thereof for engagement with gear means situated on said support, and said bearing means is formed as an integral part of said outer ring.

12. In a roundabout mechanism for carrousel type toys a one-piece molded carrier including a central hub formation with a bore therethrough, a carrousel supporting configuration in the form of a ring including integrally conformed radially disposed support portions integrally joined to and circumambient of said hub formation for supporting a carrousel motion structure; a ring of gear teeth integrally formed on one axial end of the hub formation and means integrally formed with said circumambient ring support portions of the hub, and each having individual movement relative thereto, and respectively spaced apart angularly thereabout each adapted to support a carrousel motion device.

13. A motion toy comprising a carrier rotatable about a main axis; a rotatable motion member travelling with the carrier; spindle means supporting the motion member and means rockably mounting said spindle means on the carrier; means providing a relatively stationary drive formation beneath the carrier and including an arcuately-extensive driving surface lying along a circular path radially of the main axis and sloping upwardly and outwardly therefrom; drive means on the spindle means rotatable against said surface responsive to rotation of the carrier for the purpose of rotating the spindle; and means providing for relative shiftability between said spindle means and said carrier, said rockable and shifting means operative to dispose said spindle means and drive formation in a relationship such that said drive means normally pressingly engages the drive formation at a lower level thereon and can pressingly engage said formation at all levels notwithstanding relative shifting between said spindle means and drive formation.

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