Dec. 10, 1940. L. J. SCHMID 2,224,799

MECHANICAL TOY OR DISPLAY DEVICE

Filed March 25, 1939 2 Sheets-Sheet 1

Fig. 2.

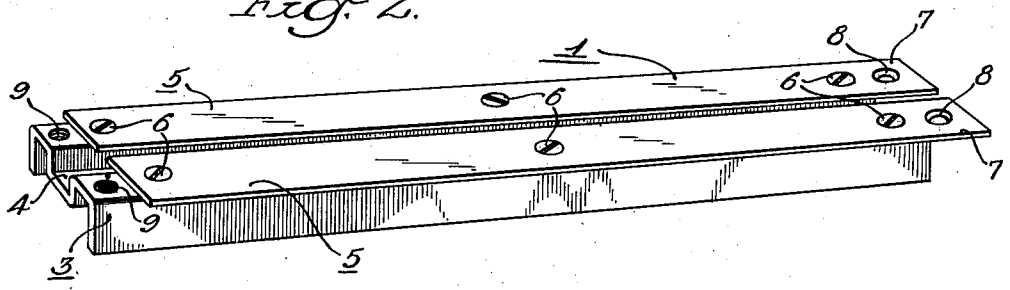


Fig. 7.

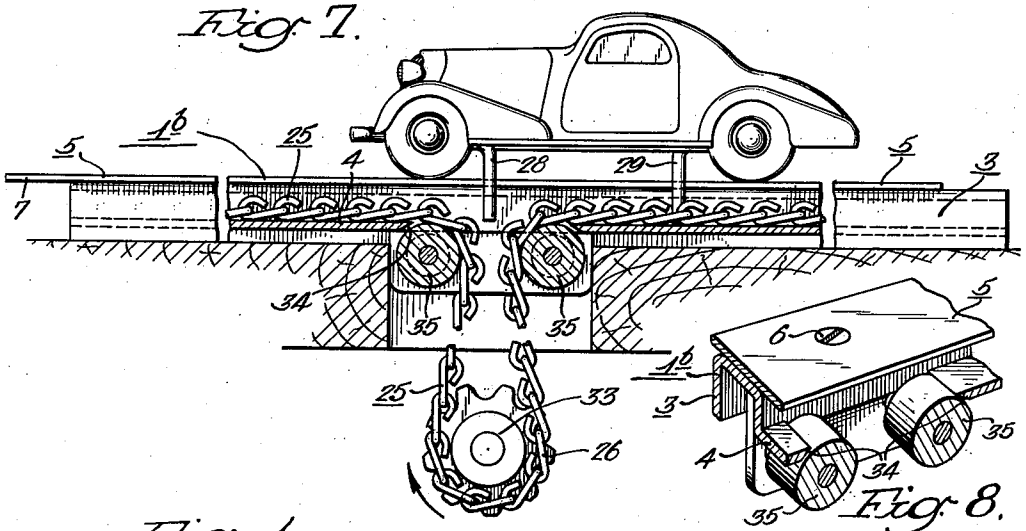
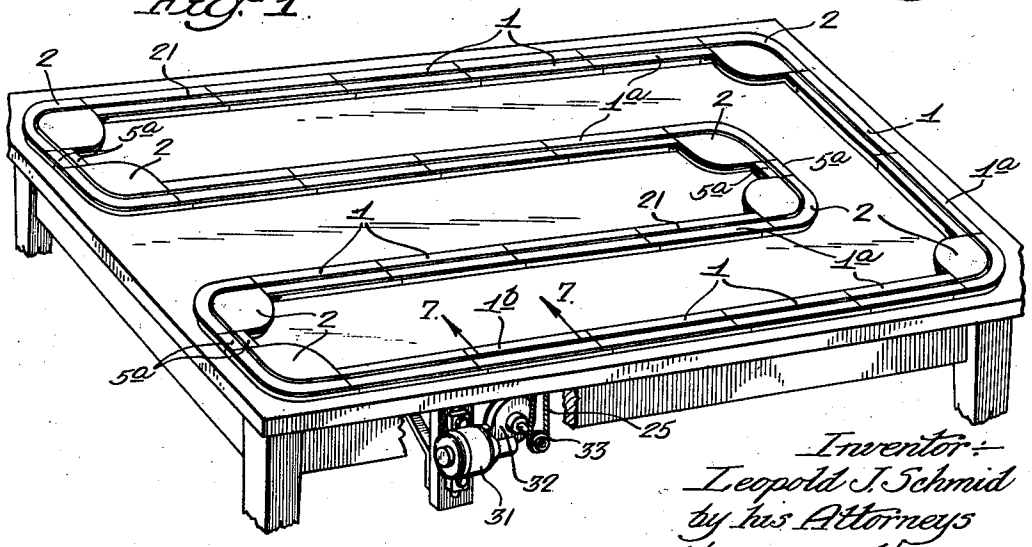


Fig. 8.

Fig. 1.



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Filed March 25, 1939 2 Sheets-Sheet 2

Fig. 4.

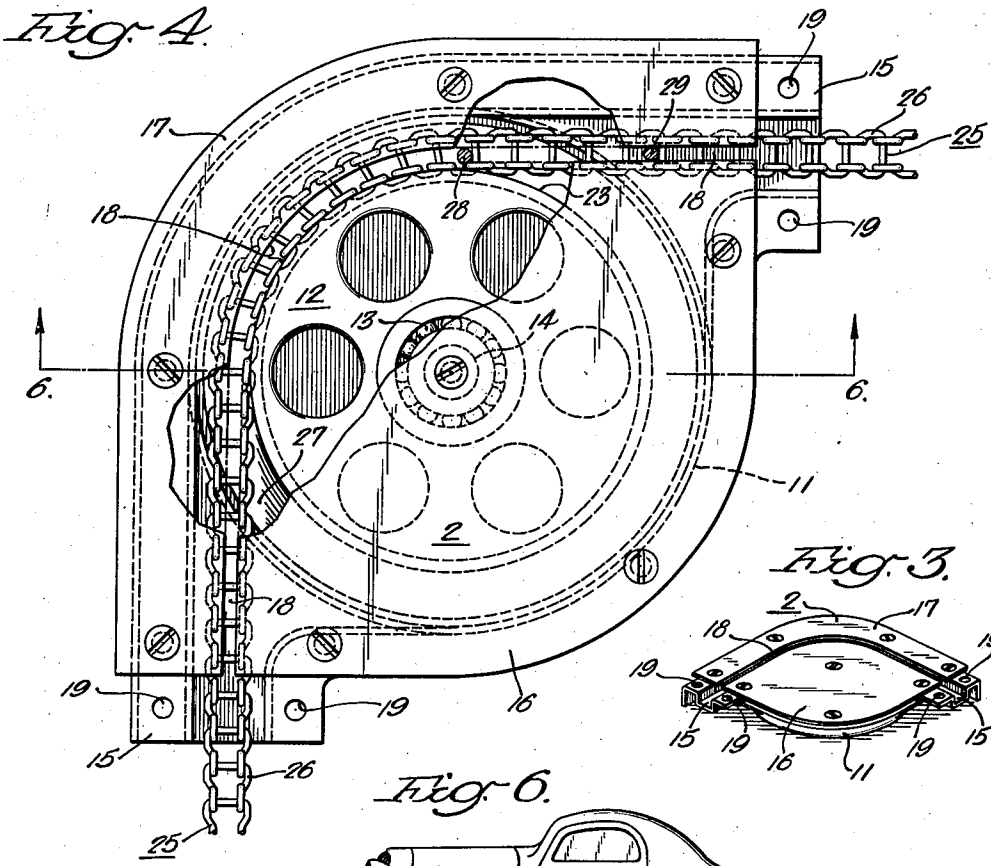


Fig. 3.

Fig. 6.

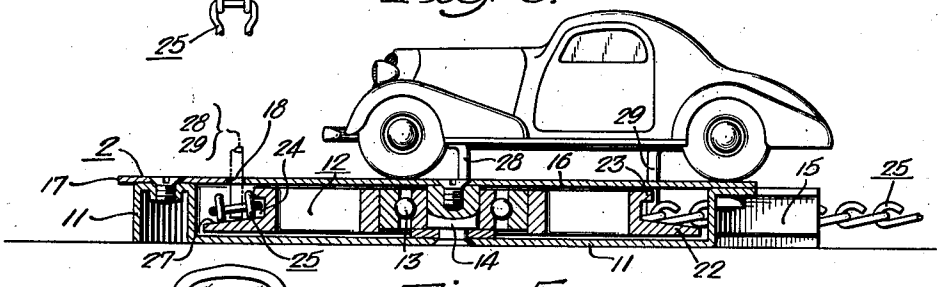
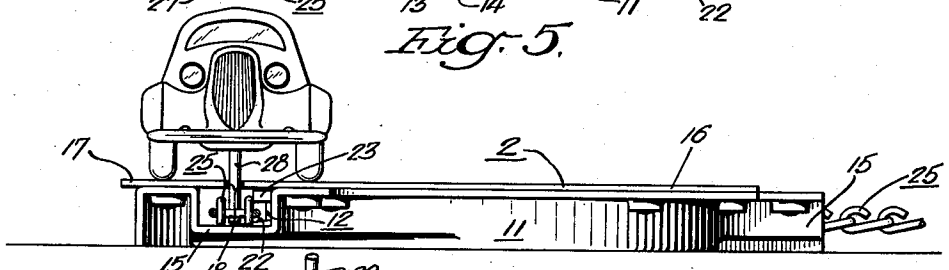


Fig. 5.



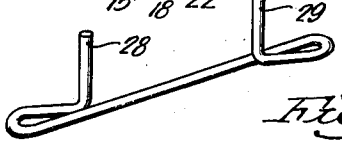


Fig. 9.

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UNITED STATES PATENT OFFICE

2,224,799

MECHANICAL TOY OR DISPLAY DEVICE

Leopold J. Schmid, Philadelphia, Pa.

Application March 25, 1939, Serial No. 264,239

8 Claims. (Cl. 104—172)

The principal object of this invention is to provide a mechanical device useful as a toy or for display purposes which shall be characterized by extreme simplicity of form and by a high degree of operating efficiency.

Another and more specific object of the invention is to provide an improved device of the type wherein various objects are advanced over a predetermined path by means of an endless conveyer, said conveyer being concealed to give the said objects a semblance of self-propulsion.

The invention further contemplates the use in a device of the stated type of novel conveying means in the form of an endless chain to which the aforesaid objects may be readily and detachably coupled at any point in the path of travel, together with novel means for causing the conveyer chain to travel in a tortuous path, while maintaining a predetermined transverse position in which the driving connection between the conveyer element and the mobile objects is continuously maintained.

The invention further resides in certain structural features and details hereinafter described and illustrated in the attached drawings, in which:

Figure 1 is a view in perspective of a device made in accordance with my invention;

Fig. 2 is a view in perspective of one of the separable sections or track units of the device;

Fig. 3 is a view in perspective of another of said units;

Fig. 4 is an enlarged plan view of the unit shown in Fig. 3, including a section of the conveyer element;

Fig. 5 is an elevational view of the unit shown in Fig. 4;

Fig. 6 is a section on the line 6—6, Fig. 4;

Fig. 7 is a fragmentary sectional view on the line 7—7, Fig. 1;

Fig. 8 is a fragmentary perspective view showing a detail of the structure illustrated in Fig. 7, and

Fig. 9 is a detached view in perspective of one of the elements of the device the function of which is hereinafter described.

With reference to the drawings, the illustrated embodiment of my device comprises a plurality of straight track sections or units, designated in Fig. 1 by the reference numeral 1, and curved or corner sections or units 2, these sections 1 and 2 being secured together, as hereinafter described, to form a continuous trackway. The form of the units 1 is best illustrated in Fig. 2, wherein it will be noted that they consist each of a base section 3, provided with a longitudinal channel 4, together with a pair of longitudinal top plates or strips 5, 5 which are secured respectively to the base member at opposite sides of the channel 4 and partially overlying the latter. In the present instance, the base member 3 is of a form suitable for manufacture from sheet metal, and the top plates or strips 5 also may be suitably made of that material. In the present instance also the strips 5 are secured to the base by screws 6, and it will be noted that each of the plates 5 at one end terminates short of the corresponding end of the base member, while the opposite ends of the strips project beyond and overhang the opposite end of the base. The overhanging portions 7, 7 of the strips 5 are of the same length as the portions of the base member 3 which project beyond the opposite ends of the strips, and the various sections (with certain exceptions hereinafter set forth) are uniform in this respect so that they may be fitted together, the sections being secured to each other by screws which pass through openings 8 in the projecting ends of the strips 5 and enter tapped holes 9 in the exposed end of the base member of the adjoining unit.

The units 2 shown in Fig. 3 and also in Figs. 4, 5 and 6 comprise a base member 11 which is substantially circular in shape for reception of a pulley wheel 12, this pulley being supported on an anti-friction bearing 13 upon a pintle 14 secured to the base member 11. The member 11 comprises two channel sections 15, 15 which extend from opposite sides of the base and tangentially to the pulley 12. Secured to the top of the base member 11 is a cover-plate 16 which overlies the pulley 12, and a curved strip 17 also secured at the top of the base member in spaced relation with the inner edge of the plate 16 forms with the latter a slotted opening 18 at the top of the unit corresponding in width to the space between the plates 5, 5 of the straight units previously described. This slotted opening 18 follows the arc of a circle overlying the peripheral portion of the pulley wheel 12, and at the opposite ends extends tangentially to this arc over the channel projections 15, 15. The plates 16 and 17 terminate short of the outer ends of the channel sections 15, and the exposed portions of the channel sections conform in length to the overhanging portions 7 of the plates 5 of the straight sections previously described, and in assembly the said overhanging portions 7 overlap the channel projections 15 and are secured thereto by screws which pass through the openings 8 and into tapped holes 19 in the channel projections 15.

With this arrangement, it is necessary, in order to form a continuous track as shown in Fig. 1, to provide a number of the straight sections with the strips 5, 5 overhanging the base section 3 at both ends, such sections being indicated in Fig. 1 by the reference character 1a. Also as shown in Fig. 1, the assembly as therein illustrated comprises short plates 5a, 5a which unite the units 2 at each of three points where those units are contiguous. It will be noted that the track exhibits at the top a continuous slot designated in Fig. 1 by the reference numeral 21 which overlies a channel extending continuously through the base members of the joined units.

The pulleys 12 are formed at their peripheral edges with two flanges 22 and 23, the first of these flanges located at the lower edge of the pulley being of relatively great radial width, and the upper surface of this flange, as shown in Fig. 6, being beveled downwardly from the inner to the outer edge of the flange. The flange 23 is relatively short in the radial direction and overhangs the extreme inner edge portion of the flange 22, leaving therebetween a peripheral channel 24 the function of which will be hereinafter described.

Extending longitudinally of the track channels previously described and around the pulleys 12 in the units 2 is an endless chain 25, the chain illustrated in the drawings being a well-known commercial type of sprocket chain consisting of an interconnected series of flat substantially U-shaped wire links 26. This chain lies flatly in the channels 4 of the straight section and maintains this same position in passing around the pulleys 12. The maintenance of the chain in this position in passing through the curved sections is a function of the peculiar construction of the pulley wheel 12 previously described. It will be noted by reference to Fig. 6 that the chain rests flatly upon the inclined upper face 27 of the flange 22, and that the inner edge portion of the chain bears in part against the outer edge of the upper flange 23 and in part extends into the channel 24 between the flanges. While a chain of the character illustrated has sufficient lateral flexibility to conform to the peripheral arc of the pulley wheel, the chain in changing direction and by reason of the tension under which it unavoidably operates has a tendency to twist from the normal plane of its travel into a position at right angles to that plane and to lie flatly against the outer face of the pulley. The chain is restrained from shifting its position from the normal plane by the flanges 22 and 23 of the pulley. Since the upper face of the flange 22 is beveled, the outer edge of the chain in passing around the pulley is slightly depressed, so that the aforedescribed tendency of the chain to change its plane of operation would normally result in an upward movement of the inner edge of the chain and a downward movement of the outer edge. Since the outer edge bears solidly against the upper surface of the flange 22, and since the inner edge is confined as previously described beneath the projecting flange 23, this change of position is prevented and the chain is constrained to travel substantially in the normal flat position which it occupies in the straight sections 1.

It will be apparent that any object resting upon the upper surface of the track assembly formed by the plates 5, 5 of the units 1 and the plates 16 and 17 of the units 2 and coupled to the chain by suitable means extending downwardly through the slot 21 will, if the chain is caused to travel longitudinally in the channel, be carried longitudinally of the track section. In Figs. 5 and 6 I have shown a model automobile the wheels of which rest upon the upper surface of the track assembly at opposite sides of the slot 21 and which is provided at the under side with a pair of pins 28 and 29 which extend downwardly through the slot 21 into engagement with the links of the chain. In the present instance the pins 28 and 29 are formed at the ends of a strip of wire, which strip is suitably secured to the under side of the model. The pins 28 and 29 function not only to couple the model to the chain, but also by engagement with the opposite edges of the slot 21 to maintain the model against lateral displacement from the track. These pins also perform a further function which will be hereinafter described. It will be noted, however, that with the arrangement shown the model may be freely lifted from the track and replaced in any desired position longitudinally of the latter.

The chain 25 is motivated by an electric motor 31, see Fig. 1, which is mounted in a position below the track, this motor being connected with the chain through a suitable reduction gear 32 and by a sprocket 33. The bottom of the chain channel of one of the units 1b of the track assembly, see Figs. 7 and 8, is cut away in part, as indicated at 34, to provide for passage of the chain downwardly in the form of a loop to the sprocket 33, and at each end of the opening 34 is a roller 35 around which the downwardly extending loop of the chain passes to the sprocket. The chain being highly flexible, it is possible to mount the rollers 35, 35 in proximity so that the space between the opposite runs of the chain at the base of the downwardly extending loop is relatively small.

Another function of the pins 28 and 29 referred to above is to bridge this gap in the normal run of the chain in the track channel, and the manner in which the pins so function is illustrated in Fig. 7. It will be noted therein that whereas the pin 28 has passed out of engagement with the chain, the pin 29 still functions to couple the model car to the chain so that the forward movement of the car is uninterrupted. Since the space between the pins 28 and 29 is less than the space between the runs of the chain at the base of the sprocket loop, it will be apparent that by the time the pin 29 passes from engagement with the chain, the pin 28 will again be in coupling engagement with the links, so that again the forward movement of the car is uninterrupted.

It will be apparent that the rollers 35, 35 may be placed sufficiently far apart to prevent the pins 28 and 29 from bridging the gap, and in that case the movement of the car or other object will be interrupted at the gap. If then two of the cars or mobile objects are used, the second will, by engaging the rear of that one which is stopped at the gap, force the latter across the gap and into coupling engagement with the chain at the far side, whereupon that car will again be set in motion while the following car is in turn stopped at the gap. Each car in turn will thus stop at the gap to be subsequently set in motion by the other. Several such gaps may be used if desired.

The form of the track units and the contour of the assembly may vary widely without departure from the invention, and it will be noted further that the curved units 2 of the track may be of a character to change the direction of movement of the chain through an angle even greater or less than the 90° angle illustrated in the drawings. It will be apparent further that the track assem-

bly is not necessarily confined to a single plane as illustrated in the drawings. The device, therefore, is a flexible one permitting various assemblies suitable for display or mechanical toy purposes. It will be noted also that in the device the chain is effectively concealed within the track unit, and that the means for motivating the car or other object is thus concealed, giving an illusion of self-propulsion.

I claim:

1. The combination with a chain consisting of a series of flat links connected together so as to lie normally in a common plane, said chain being highly flexible transversely of said plane and having only a limited degree of lateral flexibility within said plane, means for propelling said chain longitudinally, and means for guiding said chain in a laterally curved path while maintaining the links throughout the curved section substantially in the said common plane, said guide means comprising a bearing on the inside of said curve for the proximate edge of the chain, a supporting surface for engagement with one face of the chain extending outwardly at one edge of and slightly inclined away from said bearing and to the said common plane of the links, and a flange extending outwardly at the other edge of said bearing and confining the said proximate edge of the chain to the bearing.

2. The combination with a chain consisting of a series of flat links connected together so as to lie normally in a common plane, said chain being highly flexible transversely of said plane and having only a limited degree of lateral flexibility within said plane, means for propelling said chain longitudinally, and means for guiding said chain in a laterally curved path while maintaining the links throughout the curved section substantially in the said common plane, said guide means comprising a bearing on the inside of said curve for the proximate edge of the chain, said bearing being longitudinally recessed to receive the said edge of the chain and to confine said edge to a predetermined path of travel, and a supporting surface for engagement with one face of the chain, said surface extending outwardly at one edge of and slightly inclined away from said bearing and to the said common plane of the links.

3. The combination with a chain consisting of a series of flat links connected together so as to lie normally in a common plane, said chain being highly flexible transversely of said plane and having only a limited degree of lateral flexibility within said plane, means for propelling said chain longitudinally, and means for guiding said chain in a laterally curved path while maintaining the links throughout the curved section substantially in said common plane, said guide means comprising a pulley having a peripherally grooved face forming a bearing on the inside of said curve for the proximate edge of the chain, and a flange extending outwardly from one edge of said groove and providing a supporting surface for engagement with one face of the chain, said supporting surface being slightly inclined away from said groove and from the common plane of the links.

4. The combination with an endless chain consisting of a series of flat links connected together so as to lie normally in a common plane, said chain being highly flexible transversely of said plane and having a degree of lateral flexibility within said plane, an endless track structure comprising a supporting surface for said chain upon which one flat face of the chain is adapted to rest, said track structure having curved sections, and guide means for maintaining the individual links throughout the curved sections in the normal flat position upon said support, said support having an opening through which a portion of said chain may pass in the form of a depending loop, a sprocket engaging said loop, and means for rotating said sprocket to longitudinally propel the chain, said track structure comprising also an element spaced above said support and having therein a longitudinal slot overlying the chain, an object adapted to travel on said element and having a plurality of coupling pins adapted to extend downwardly through said slot into engagement with the links of said chain, said coupling pins being spaced apart longitudinally of the slot to an extent permitting said pins to simultaneously engage the chain at opposite ends of said depending loop to thereby provide for continuous movement of said object past the looped portion of the chain.

5. The combination with a transversely curved longitudinally slotted track, of a chain consisting of a series of interconnected flat open links, means for guiding said chain in a longitudinal path below the said slot and for maintaining the planes of the individual links throughout said path of travel substantially parallel to said track, said guide means comprising a support for the chain underlying and substantially paralleling said track and having an opening providing for passage therethrough of a portion of said chain in the form of a loop, a sprocket engaging said loop, means for driving said sprocket to propel the chain in said longitudinal path, and an object movable on said track and having a plurality of pins extending downwardly into the open links of said chain to thereby couple said object to the chain, said pins being relatively spaced longitudinally of the track to an extent providing for simultaneous engagement of said pins with the links at opposite ends of said loop to thereby afford an uninterrupted movement of said object with the chain.

6. The combination with an endless chain consisting of a series of flat links connected together so as to lie normally in a common plane, said chain being highly flexible transversely of said plane and having a degree of lateral flexibility within said plane, an endless track structure comprising a supporting surface for said chain upon which one flat face of the chain is adapted to rest, said track structure comprising a plurality of straight and curved sections adapted to be assembled in end-to-end relation, and each of said curved sections having guide means in the form of a pulley having a peripheral groove adapted to receive the inner curved edge of said chain, together with a flange extending outwardly from the lower edge of said groove and providing a bearing surface for the under face of said chain, said surface being slightly inclined away from said bearing and to the said common plane of the links, said supporting surface having an opening through which a portion of said chain may pass in the form of a depending loop, a sprocket engaging said loop, means for rotating said sprocket to longitudinally propel the chain, said track structure comprising also an element spaced above said support and having therein a longitudinal slot overlying the chain, and an object adapted to travel on said element and having a plurality of coupling pins adapted to extend downwardly through said slot into engage-

ment with the links of said chain, said coupling pins being spaced apart longitudinally of the slot to an extent permitting said pins to simultaneously engage the chain at opposite ends of said depending loop to thereby provide for continuous movement of said object past the looped portion of the chain.

7. The combination with a transversely curved longitudinally slotted track, of a chain consisting of a series of interconnected flat open links, means for guiding said chain in a longitudinal path below the said slot and for maintaining the planes of the individual links throughout said path of travel substantially parallel to said track, said guide means comprising a support for the chain underlying and substantially paralleling said track and having an opening providing for passage therethrough of a portion of said chain in the form of a depending loop, the gap at the mouth of said loop interrupting the continuity of the chain on said support, means for propelling the chain in the longitudinal path, and an object movable on said track and having a pair of pins extending downwardly into the open links of said chain to thereby couple said object to the chain, said pins being relatively spaced longitudinally of the track to an extent less than the extent of said gap, whereby at the gap the said movable object is automatically uncoupled from the chain.

8. The combination with a transversely curved longitudinally slotted track, of a chain consisting of a series of interconnected flat open links, means for guiding said chain in a longitudinal path below the said slot and for maintaining the planes of the individual links throughout said path of travel substantially parallel to said track, said guide means comprising a support for the chain underlying and substantially paralleling said track and having an opening providing for passage therethrough of a portion of said chain in the form of a depending loop, the gap at the mouth of said loop interrupting the continuity of the chain on said support, means for propelling the chain in the longitudinal path, and an object movable on said track and having a pair of pins extending downwardly into the open links of said chain to thereby couple said object to the chain, said pins being relatively spaced longitudinally of the track to an extent less than the extent of said gap, whereby at the gap the said movable object is automatically uncoupled from the chain, and a second object movable on said track and having coupling pins similar to those of the object first named, said second object being operative when advanced by said chain to engage the said first object at the gap and to thereby move the latter object to an extent effecting a recoupling thereof with the chain.

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