

P. H. WOODRUFF.
TOY RAILWAY.
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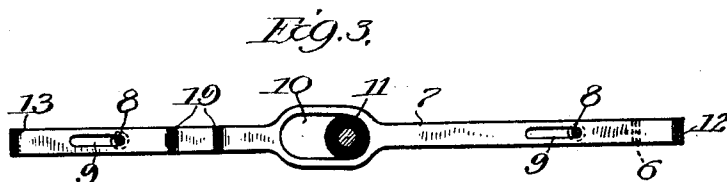
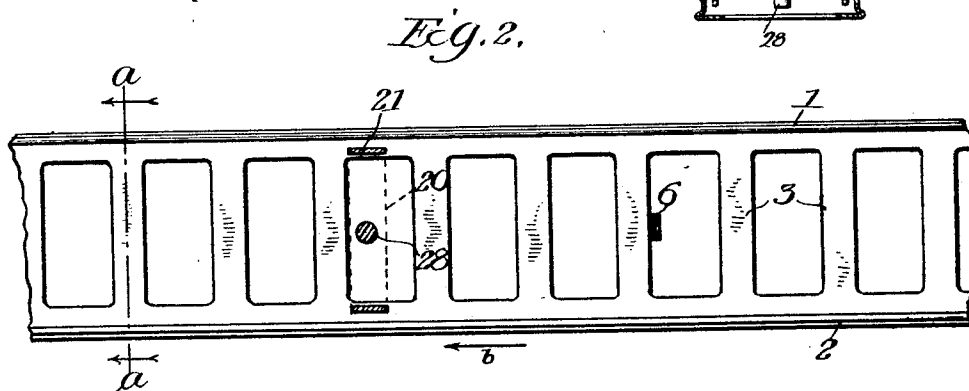
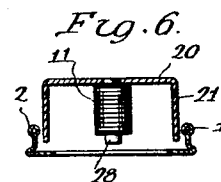
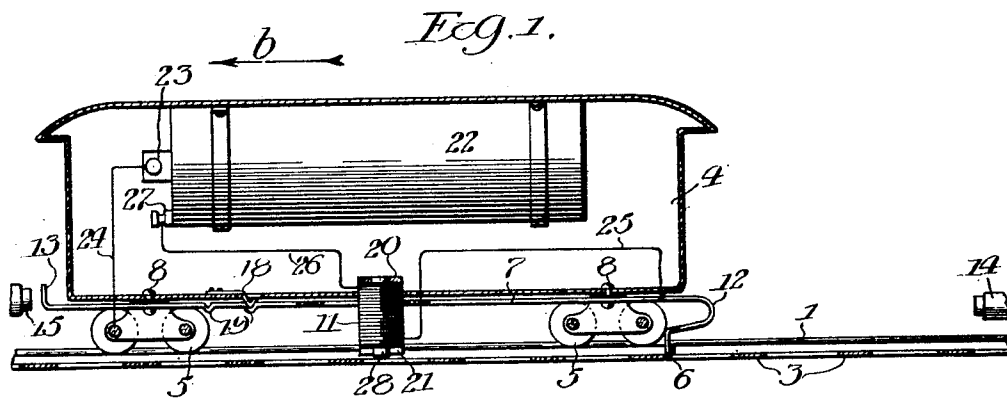


Fig. 5.

Witnesses
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Fig. 4.

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UNITED STATES PATENT OFFICE.

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TOY RAILWAY.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, PAUL H. WOODRUFF, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Toy Railways, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to motive devices and has for its object the provision of an improved electrically propelled device.

My invention is, for instance, of particular utility when used in connection with toy railways or other toy motive devices.

Generally speaking my invention contemplates provision of motion for a device by means of electro-magnetic means without the use of the ordinary rotating motor.

When my invention is applied to toy devices the great saving in cost of manufacture will be readily apparent.

In a general form of the invention I provide a plurality of magnetic elements which in association with a magnet upon a movable device serve to cause a movement of the movable device when the electro-magnet is intermittently energized. In the description herein I am describing my invention as particularly applied to a toy railway, but as before stated my invention is not to be so limited as its applications are various. I will therefore describe one form of carrying out my invention in connection with the accompanying drawing illustrating the same as specifically applied to a toy railway, in which—

Figure 1 is a diagrammatic view partly in section of a system of locomotion equipped in accordance with my invention; Fig. 2 is a top view of the track employed; Fig. 3 is a detail view of the controlling mechanism; Fig. 4 is a detail view of a bumper employed; Fig. 5 is a sectional view on line *a-a* of Fig. 2, and Fig. 6 is a detail of construction.

Referring more particularly to Figs. 1, 2 and 5, I show a track having the two rails 1 and 2 which in the form herein shown form an integral part of cross-ties 3, 3, the complete structure including the

rails and the cross-ties preferably being punched and bent from a single piece as stated. This track is of magnetic material so that it forms part of an electro magnet as will appear later. A car 4 having wheels 5, 5 is adapted to operate along the rails 1 and 2 and this car carries a movable contact element 6 adapted to engage the cross-ties 3, 3 periodically as the car moves along the track. This contact 6 is mounted upon a bar 7, which bar is confined in its movement by the pins 8, 8, for which purpose slots 9, 9 are provided in said bar. A further central slot 10 is provided in this bar to accommodate an electro magnet 11 whose purpose will presently appear. The bar 7 has a downward extension 12 at one extremity and an upward extension 13 at the opposite extremity which are adapted to cooperate with bumpers 14 and 15 respectively, each bumper having a plunger 16 pressed outwardly by the spring 17. Thus when the car reaches the limit of its track in one direction either of the arms 12 and 13 engage their respective bumpers whereby the bar 7 is moved to its alternative position and held therein by means of the spring 18 cooperating with slots 19, 19. The electro magnet 11 is mounted on the car and has a heel piece 20 of U-shape, which heel piece has legs 21, 21 as shown in Fig. 6. A battery 22 is provided in the car and a circuit is established from the carbon 23 of the battery through conductor 24, wheel 5, track 1, cross-tie 3, contact 6, arm 12, conductor 25, electro magnet 11, conductor 26 to the zinc terminal 27 of the battery 22.

Now whenever the element 6 contacts with a tie 3 the electro magnet 11 having the downwardly extending core 28 is energized. The elements are so arranged that contact is made by the element 6 whenever the core 28 is closest to the cross-tie toward which the car is moving. As shown in Fig. 2, assuming that the car is traveling in the direction of the arrow *b*, the core 28 is closer to the tie 3 toward its left than it is to the tie 3 on its right and it is about this time that the contact at 6 is established. Thereby an electro-magnet 11 is energized and it tends to approach the tie 3 on its left, thereby causing the car to move toward the

left. The contact is maintained for the entire width of the tie, after which the contact is broken but the momentum of the car carries it on until the element 6 contacts with the next tie toward the left. Should the arm 7 be moved toward the right by engaging the bumper 15, then the elements are in such a position that the car will tend to travel toward the right, the spring pressed bumper 15 serving to give the car a slight movement in the opposite direction to start with.

It will thus be seen that as the core 28 approaches a tie the electro magnet is energized and thereby the car is drawn in the direction in which it is going and this is repeated with each succeeding tie. In this way a continuous forward movement of the car is had until the bar 7 is reversed. It will be seen that no motor is necessary as the electromagnet 11 together with the ties provide the necessary motive power.

As before stated, of course, my invention is not to be limited to the specific embodiment herein shown as it is capable of various applications, such as fall within the scope of the appended claims, but

Having thus described one form which my invention may take, what I claim as new and desire to secure by Letters Patent is:

1. In a toy railway in combination with a car, of a roadbed therefor, having successively arranged elements of magnetic material, an electro magnet provided on said car, means to periodically energize said electro magnet to thereby cause it to successively travel over the path of the magnetic elements aforesaid, and means to control the aforesaid means to thereby change the time of energization of said electro magnet whereby to reverse the direction of motion of said car, said last aforesaid means including a resiliently mounted bumper.

2. In a toy railway in combination with a car, of a roadbed therefor, having successively arranged elements of magnetic material, an electro magnet provided on said car, means to periodically energize said electro magnet to thereby cause it to successively travel over the path of the magnetic elements aforesaid, said means causing the energization of said electro magnet at a time when its core is nearer to an approaching magnetic element than to a receding magnetic element, and means to control the aforesaid means to thereby change the time of energization of said electro magnet whereby to reverse the direction of motion of said car, said last aforesaid means including a resiliently mounted bumper.

3. In a toy railway in combination with a car, of a roadbed therefor, having successively arranged elements of magnetic material, an electro magnet provided on said car, means to periodically energize said

electro magnet to thereby cause it to successively travel over the path of the magnetic elements aforesaid, said means causing the energization of said electro magnet at a time when its core is nearer to an approaching magnetic element than to a receding magnetic element and discontinuing energization when said electro magnet is over a magnetic element, and means to control the aforesaid means to thereby change the time of energization of said electro magnet whereby to reverse the direction of motion of said car, said last aforesaid means including a resiliently mounted bumper.

4. In a toy railway in combination with a car, of a roadbed therefor, said roadbed comprising a pair of rails and cross-ties of magnetic material electrically associated, an electro magnet provided on the car, and a circuit controlling element on said car, adapted to periodically engage said cross-ties, thereby to energize said electro magnet as it is nearer an approaching cross-tie than to a receding cross-tie, and to discontinue said energization when said electro magnet is over a cross-tie.

5. In a toy railway the combination with a road bed made of magnetic material and consisting of cross-ties and rails magnetically associated, of a car, an electro magnet provided on the car adapted for successive electro magnetic association with said cross-ties, and a circuit controlling element on said car adapted successively to engage said cross-ties to thereby energize said electromagnet as it is nearer an approaching cross-tie than to a receding cross-tie and to discontinue said energization when said electro magnet is over a cross-tie.

6. In a toy railway the combination with a road bed made of magnetic material and consisting of cross-ties and rails magnetically associated, of a car, an electro magnet provided on the car adapted for successive electro magnetic association with said cross-ties, a circuit controlling element on said car adapted successively to engage said cross-ties to thereby energize said electro magnet as it is nearer an approaching cross-tie than to a receding cross-tie and to discontinue said energization when said electro magnet is over a cross-tie and wheels for said car adapted to operate upon said rails to complete the electric circuit from said circuit controlling element through said electro magnet.

7. In a toy railway in combination with a car, of a road bed therefor, said road bed comprising a pair of rails and cross-pieces of magnetic material electrically connected, an electro magnet provided on the cars, a circuit controlling element on said car adapted to periodically engage said cross-pieces, thereby to energize said electro magnet as it is nearer an approaching cross-

piece than to a receding cross-piece, and to
discontinue said energization when said
electro magnet is over a cross-piece, and
wheels provided on said car to complete
5 the electric circuit from said circuit con-
trolling element through said rails and
cross-pieces.

In witness whereof, I hereunto subscribe
my name this 29th day of February, A. D.,
1912.

PAUL H. WOODRUFF.

Witnesses:

O. M. WERMICH,
HAZEL JONES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."