June 16, 1931. H. E. LOVING 1,810,250

ELECTRICAL TOY

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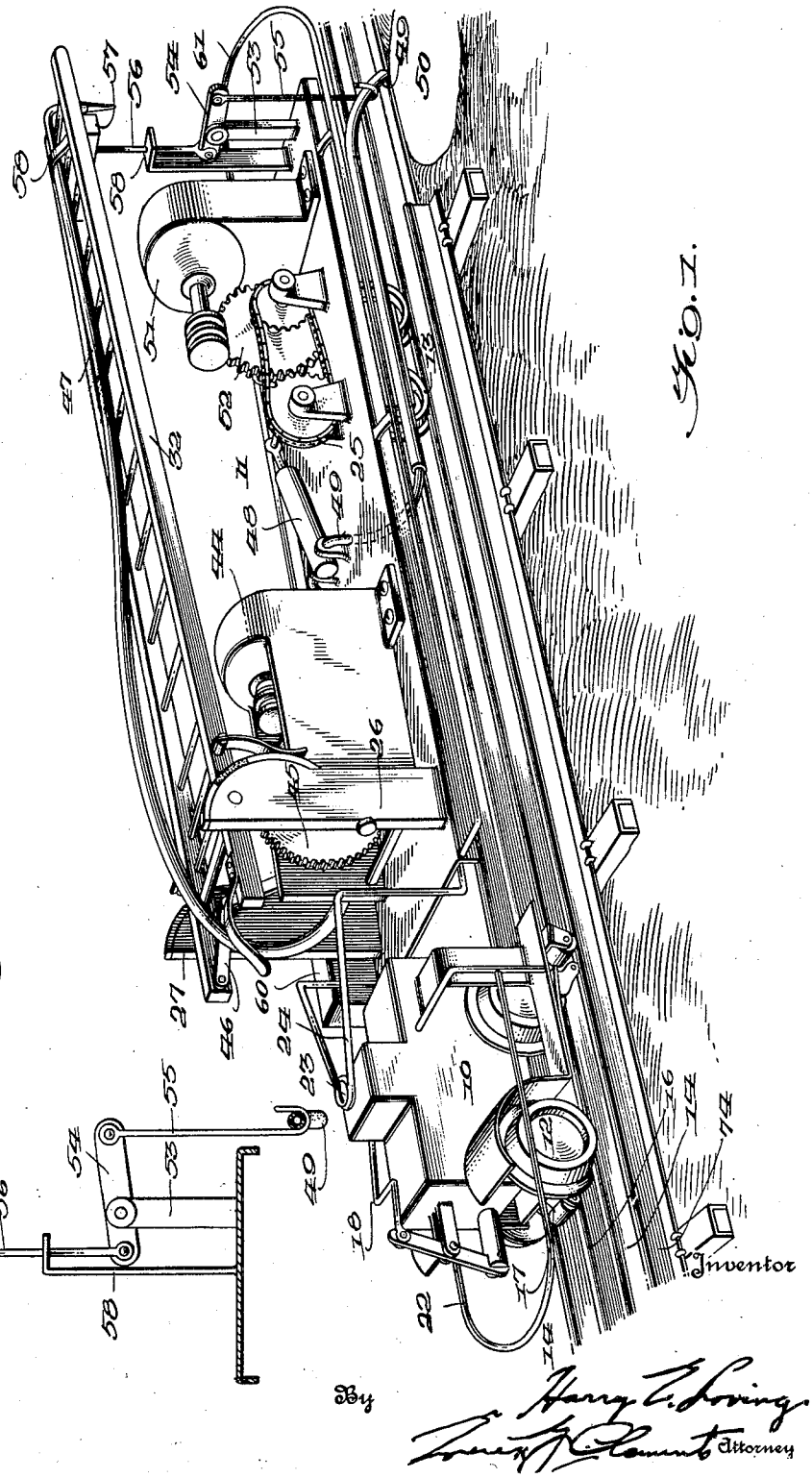


Fig. 1.



Fig. 2.

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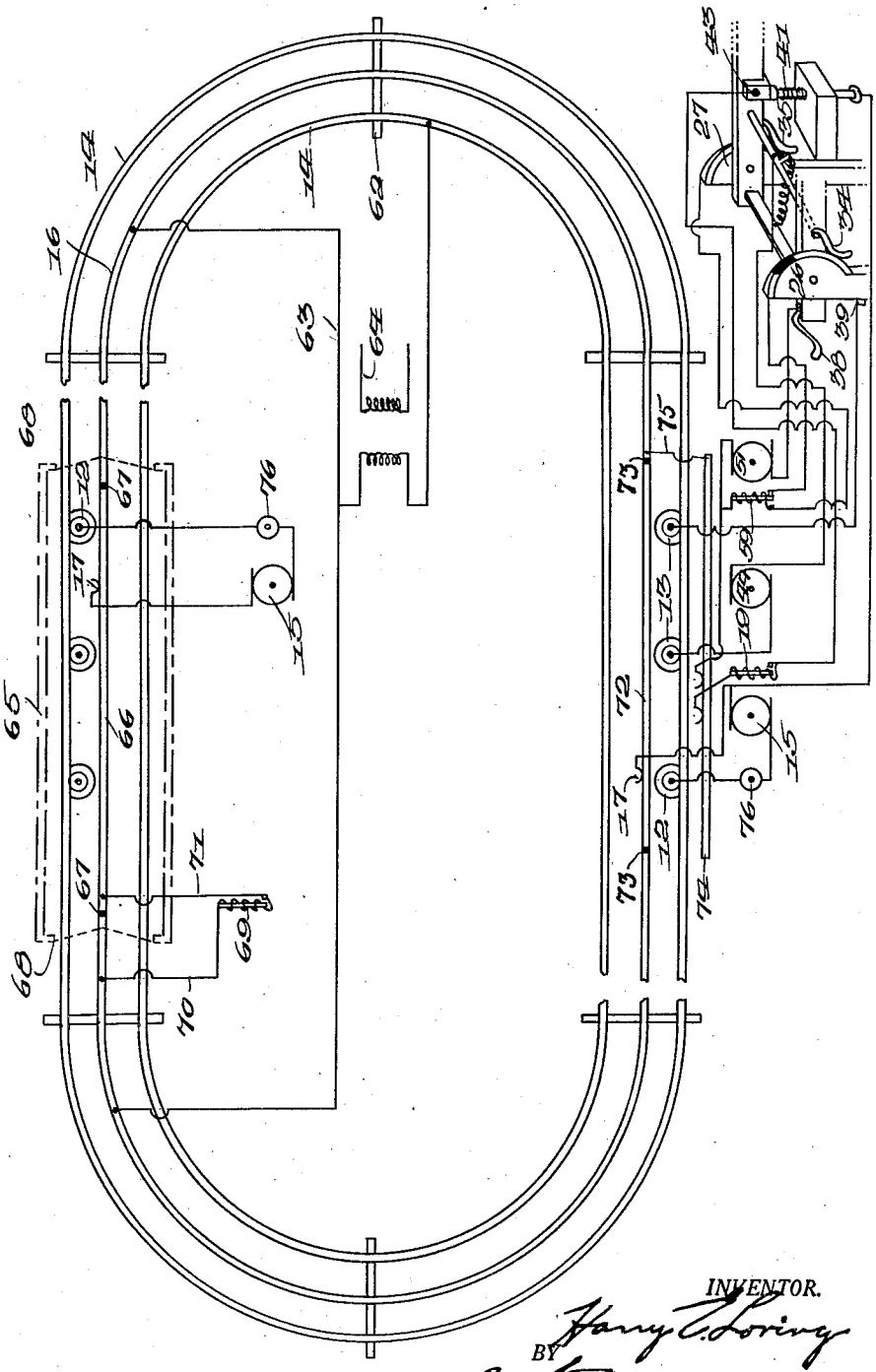


Fig. 3

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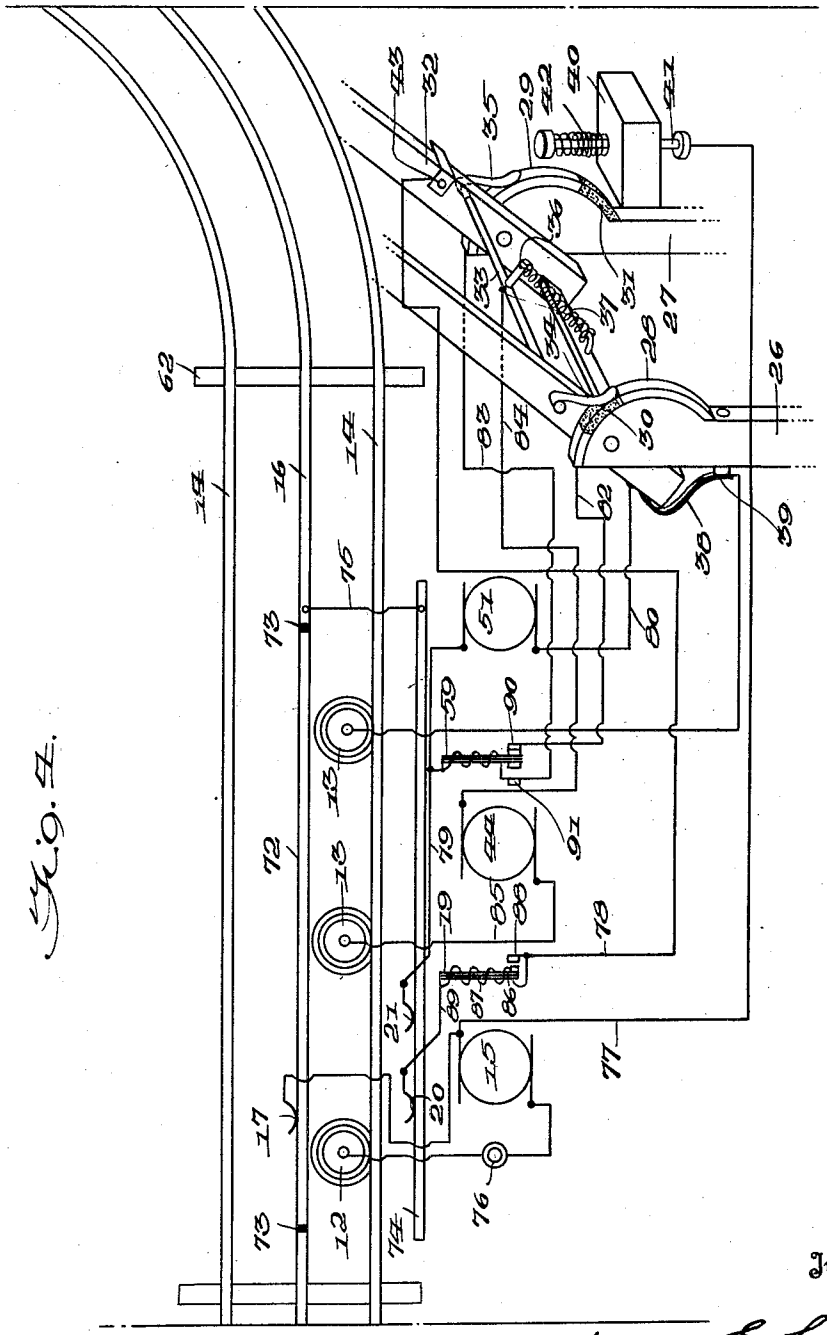


Fig. 4.

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# UNITED STATES PATENT OFFICE

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## ELECTRICAL TOY

Application filed May 29, 1930. Serial No. 457,461.

The present invention, in its broadest aspect, relates to motor-control systems, and especially to toy motor-control systems. More particularly, this invention relates to such systems of controls as are employed in connection with toy locomotives, toy fire engines, and the like, for operation on a trackway.

A primary object of the invention is to provide a novel motor-control system adapted to control a plurality of motors in a predetermined order to automatically effect the operation of a plurality of devices in a prearranged manner and in a predetermined order.

Another object of this invention is to provide a motor-control system of the above-described character which shall include a plurality of control switches including electrically controlled thermostats and make-and-break contacts carried by one of the aforementioned devices.

More specifically, it is among the objects of the present invention to provide a novel electrical toy fire apparatus which shall be adapted to be propelled along a guiding means including a pair of spaced insulated sections; to provide automatic means adapted, at predetermined intervals, to propel the apparatus from one insulated section to another; to provide means for insuring the stopping of the apparatus at each of said sections; to provide a hose and ladder on the apparatus and means for automatically causing said ladder to be raised and water to be pumped and discharged in a continuous stream from said hose only while the apparatus is situated at one of said insulated sections; to provide means insuring that the ladder shall be lowered and the hose discharge ended before the apparatus is able to move away from the said insulated section; and to provide means whereby the raising and lowering of the ladder controls the access of the hose end to the water source.

With the above and other objects in view which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

An illustrative and preferred embodiment of the invention is shown in the accompanying drawings, in which:

Fig. 1 is a perspective view of an electrical toy fire apparatus installation embodying the present invention;

Fig. 2 is a detail view of the ladder-controlled hose-end raising and lowering device;

Fig. 3 is a combined plan view of the trackway and diagrammatic views of the effective wiring systems at each of the insulated back sections; and

Fig. 4 is an enlarged diagrammatic view of one of the insulated back sections shown in Fig. 3, and hereinafter referred to as the "operating sector". In this view the circuits and circuit controlling means on the toy appartus are also diagrammatically illustrated.

Similar reference characters designate corresponding parts throughout the several figures of the drawings.

Referring to the drawings, and more particularly to the showing of the toy fire apparatus per se as shown in Fig. 1, it will be seen that this may comprise primarily a driving or tractor member 10 and a driven or trailer member 11, mounted respectively upon tractor wheels 12 and trailer wheels 13. The wheels 12 and 13 are adapted to be mounted upon the rails 14 of a continuous trackway.

The tractor member 10 may carry a tractor motor 15 of any desirable or suitable type for driving the tractor wheels 12. The tractor motor 15 is shown as adapted to receive its power from the live third rail 16 through collector shoe or roller 17 riding on the said third rail. Mounted at the forward end of the tractor member 10 may be a solenoid-operated brake 18. Also mounted within and supported by the tractor 10 may be the thermostatic switch 19. Depending from one of the fenders of the tractor in a manner to enable them to coact with an extra or fourth rail (described

in detail hereinafter) are two mutually insulated collectors, which may take the form of contact rollers 20 and 21. Extending around and beyond the forward end of the tractor is the guard rail 22.

Referring now more specifically to the trailer 11, this may be coupled to the tractor member 10 in any desirable manner, as by coupling means 23 and 24. Mounted upon the trailer wheels 13 is the trailer chassis 25. At the forward end of the chassis and extending upwardly therefrom may be disposed a pair of spaced ladder-supporting uprights 26 and 27. These uprights may preferably be made of a non-conducting fibrous material, such as wood and the like. The upper ends of the respective uprights 26 and 27 may be formed with enlarged rounded portions, as is clearly shown in Figs. 1 and 4. Situated upon the said enlarged portions and correspondingly shaped are a pair of arcuate brass contact members 28 and 29. Adjacent the upper end of brass contact 28, the latter merges into an insulated non-conducting portion 30. A similar non-conducting portion 31 is disposed adjacent the lower end of the other brass contact 29.

Pivotally mounted at its lowermost end between the uprights 26 and 27 is the ladder 32. Depending from the opposite sides of the ladder, and connected together by the metallic rod 33, which is disposed a slight distance above the point of support of the ladder, are a pair of brass brushes 34 and 35. As shown, the brush 34 is adapted to slide along the brass contact 28 on the upright 26, while the brush 35 is adapted to similarly cooperate with the brass contact 29 on the upright 27. The rod 33 is loosely mounted on the ladder, and extending from the middle thereof may be a lug 36. Spring means 37, extending from said lug to the lowermost rung of the ladder 32, may be provided. In this way, a positive slidable connection between the brass brushes 34 and 35 and the contact devices disposed on uprights 26 and 27, is assured.

Depending from the lowermost end of one side of the ladder 32 is a flexible brass contact 38 which is adapted to cooperate with another contact 39 disposed on the upright 26 as shown. Extending laterally from the upright 27 may be a ledge or block 40 adapted to loosely support the depressible brass contact 41. A spring 42 is interposed between the block 40 and an enlargement on the upper end of depressible contact 41. Upon the corresponding side of the ladder 32 and situated at a point on the ladder whereby it is adapted to contact with the contact 41, is another brass contact 43.

From the above-described arrangement of contacts, it will be seen that when the ladder is in its lowermost position contacts 41 and 43 will be closed, and contact 35 will rest on the non-conducting portion 31. When the ladder is in its uppermost position, contacts 38 and 39 will be closed, and contact 34 will rest on the non-conducting portion 30.

Means for raising and lowering the ladder is preferably provided adjacent the uprights 26 and 27 in the form of any desirable motor 44. This motor may be operatively connected to the lower end of the ladder by any conventional train of reduction gearing 45 for slowly rotating a crank arm (not shown) to reciprocate a pitman or lever 46, pivotally connected to the lower end of the ladder. On outward or inward movement of the pitman, the ladder is swung about its pivotal mounting in the apparatus, to effect the raising and lowering of the ladder 32.

Carried by the ladder, and terminating in a nozzle adjacent the upper end thereof, may be a section 47 of hose. The other end of the hose 47 is connected to one side of the pump 48. Another section 49 of hose extends from the other side of the pump, and is adapted to be supported along one side of the chassis. Means (described in detail hereinafter) is provided for raising and lowering the free end of hose section 49 relative to a water-containing trough 50, which may depend from the chassis 25 in any suitable manner, or may be disposed adjacent the trackway, as shown in Fig. 1.

A pump-operating motor 51 is preferably mounted adjacent the rear end of the chassis 25, and the pump 48 may be driven from said motor through the medium of any conventional system of gears and levers, such as shown, for example, at 52.

Coming now to the means adapted to effect the raising and lowering of the free end of hose section 49, it will be seen, by reference to Figs. 1 and 2, that this may consist of a post 53 extending upwardly from the chassis 25 adjacent the rear end thereof. Pivotally secured to the post 53 in a manner to form a pair of arms of unequal length, is the lever 54. Depending from the end of the longer arm is the hook-ended rod 55, in the hook end of which the free end of hose section 49 is lodged. Extending upwardly from the end of the shorter arm of lever 54 is the operating rod 56. A relatively light transverse or T-forming member 57 is suitably attached to the upper end of rod 56. Guiding means, which may assume the form of the right-angled bar 58 extending upwardly from the chassis 25, may be provided for the rod 56. In the embodiment shown, the rod 56 reciprocates through an opening in the upper bent-over end of the bar 58. The combined height of the members 56 and 57 is so regulated that when the

ladder 32 is lowered, the outer end thereof is adapted to rest upon and depress the transverse member 57 and maintain the lever 52 in substantially horizontal position. The length of the rod 55 is regulated so that when the lever 54 is substantially horizontal the hose end is raised from the trough 50. It is thus seen that when the ladder is down, the free end of the hose section 49 is supported above the surface of the water in the trough 50. As soon, however, as the ladder is caused to be raised off the cross member 57, the weight of hose end 49 causes the rod 53 to drop, lowering the hose end into the trough.

Strap means 58 or the like may be provided for securely holding the nozzle end of the hose section 47 in place on the ladder.

A double throw thermostatic switch 59 may be enclosed within the box-like container 60 situated upon the chassis 25 at any convenient place thereon.

As shown in Figure 1, a second guard rail 61 may be disposed around the trailer member 11.

Referring now more particularly to Fig. 3, this shows the preferred railway track system upon which the hereinbefore described apparatus is adapted to ride. As has already been pointed out, the track system comprises a pair of main rails 14, adapted to be attached in properly spaced relation to each other and in suitable lengths by means of conventional cross ties 62. A live third or power rail 16 extends between the main rails, and is secured to and insulated from the main rails 14 in any conventional manner. The tracks are preferably made in standard sections which may be joined together by any conventional means, such as the well known pin and socket connection. Power is supplied to the live rail by means of conductor wires 63 from any suitable source 64.

At the point along the track where the fire-house 65 (Fig. 3) is located, a section 66 of the live third rail 16 is insulated from the remainder thereof in any conventional way, as by replacing the usual metallic pins by fibre pins, diagrammatically illustrated at 67. The section 66 may well be termed the "fire-house sector". The fire-house 65 is adapted to house the entire fire apparatus, and is preferably provided with spring-hinged swinging front and rear doors 68. Disposed adjacent the fire-house sector is a thermostatic switch 69. Conductor wires 70 and 71 respectively connect the thermostatic switch to third rail 16 and insulated section 66.

A second section 72 of rail 16 is also insulated by fibre pins 73 from the remainder thereof, as above described in connection with the fire-house sector. This section may be termed the "operating sector". Adjacent this sector and substantially coextensive therewith is a live extra or fourth rail 74, as shown. This rail may be disposed on either side of the main tracks 14, dependent upon which side the contact shoes or rollers 20 and 21 are disposed, and is adapted to be electrically connected to the third rail 16 by conductor wire 75.

Referring to the wiring of the fire apparatus as shown in the diagram illustrated in Figs. 3 and 4, it will be seen that the contact shoe or roller 17 is connected to one side of the tractor motor 15, the other side of the motor being connected to one of the terminals of the solenoid 76 of the brake 18. The other solenoid terminal may be grounded through the tractor body 10 and wheel 12, as shown. From the first-mentioned side of the motor 15, a conductor wire 77 also extends to the depressible contact 41 carried on the upright 27.

Collector or contact shoe 20 is electrically connected to one terminal of thermostatic switch 19, and the other terminal is connected to contact 43 on the ladder 32, by conductor wire 78.

Contact shoe 21 is electrically connected by conductor 79 to one terminal of the thermostatic switch 59, from which the conductor 79 extends to one side of the pump-motor 51. The other side of pump-motor 51 is connected by conductor 80 to flexible contact 38 on the lower end of the ladder. Contact 39 on unpright 26 may be grounded through conductor 81 to chassis 25 and wheel 13, as shown. The other two terminals of thermostat 59 are respectively connected to contacts 28 and 29 by conductors 82 and 83.

On side of the ladder-operating motor 44 is connected by conductor 84, to the rod 33, and thus to the contact brushes 34 and 35. The other side of motor 44 may be grounded through the chassis 25 and wheels 13 by conductor 85.

The thermostatic switches 19 and 69 are similar in construction and operation, and a description of one will serve for both. The switch 19 (see Fig. 4) comprises a flexure member 86 having a high resistance winding 87 and an outlet terminal 88 normally out of contact with the free end of the flexure member 86 and electrically connected to one end of the high resistance winding 87. The opposite end of the winding 87 and corresponding end of the flexure member 86 are electrically connected by conductor 89 to contact shoe 20.

The thermostatic switch 59 is of like construction and operation, it being noted, however, that two relatively spaced outlet terminals 90 and 91 are employed, terminal 90 being normally in contact with the free end of the flexure member.

The operation of the device is as follows: Assuming that the tracks are connected,

substantially as shown in Fig. 3, and a source of current connected thereto as shown, the apparatus is placed on the track in the fire-house 65 and on the insulated fire-house sector 66. The circuit is then completed between the insulated third rail section 66 and ground rails 14 through the thermostatically-controlled circuit which bridges rails 66 and 16 on opposite sides of insulated pin 67.

Due to the resistance in the circuits imposed by the winding of the thermostatic switch 69 the apparatus remains stationary on this track sector until the flexure member of the thermostatic switch 69 is heated sufficiently by the winding to cause it to warp and make contact with the outlet terminal, bridging out the winding and permitting full current to pass to the sector 66 and tractor motor 15. The brake operating solenoid 76, being connected in series with the tractor motor, is energized upon passage of current to the motor releasing the motor brake 18 and the apparatus is propelled out of the sector 66.

The spring-hinged doors 68 of the fire-house 65 are pushed open by the guard rail 22 which extends around the front of the apparatus, and the doors close again after the apparatus has passed by. The doors are kept clear of the main body of the device by the guard rails 22 and 61, thus preventing dislodgment by the doors of any object which may be carried along the sides of the apparatus, such as removable ladders, etc.

The fire apparatus travels along the trackway until the insulated operating sector 72 is reached. As soon as the collector shoe 17 rides from the live rail 16 onto the section 72, the supply of current to the motor 15 and motor brake solenoid 76 is cut off. Operation of the motor ceases as the brake 18 is applied to positively stop the apparatus within the limits of the sector 72. As the shoe 17 rides onto this insulated sector, the mutually insulated collector or contact shoes 20 and 21 come into contact with the live extra or fourth rail 74.

Upon contact of the shoe 21 with the extra live rail 74, the ladder 32 being down as shown in Figs. 1 and 3, current passes from conductor 79 through the flexure member of thermostatic switch 59, outlet terminal 90 and conductor 82 to the arcuate contact 28 on the ladder supporting upright 26, hence through brush 34, rod 33 and conductor 84 to the field side of the ladder-operating motor 44.

The motor starts, and through the system of gears and levers heretofore described, the ladder 32 is raised to a substantially upright position. As the ladder rises, the brush 35, which is also electrically connected to the rod 33, leaves the insulated portion 31 and slides onto the brass contact 29 on upright 27. When the ladder reaches its uppermost position the brush 34 slides onto the insulated portion 30, breaking the circuit through conductor 82 and causing the ladder-operating motor 44 to stop. It will be noted that brush 35 now rests on the arcuate contact 29, completing the circuit to the motor 44 through the high resistant winding on the flexure member of the thermostatic switch 59. Due to the resistance now imposed in the circuit, the motor 44 remains idle while the ladder is in elevated position, for approximately 60 seconds, during which time the winding of the thermostatic switch 59 heats up, causing the flexure member to warp and make contact with outlet terminal 91, bridging out the winding and permitting full current to pass by conductor 83 to the arcuate contact 29, hence to the ladder-operating motor 44. The motor is again started and through the system of levers and gears returns the ladder to normal or horizontal position. When the ladder reaches its lowermost position, the motor is again stopped as the brush 35 leaves the contact 29 and slides onto the insulated portion 31.

It will be noted that during the interval of time the ladder is raised, contacts 41 and 43 in the tractor motor-operating circuit are broken, preventing passage of current to the motor 15 from the live rail 74 through contact 20, thermostatic switch 19 and conductors 77 and 78.

As the ladder reaches its uppermost position, flexible contact 38, mounted on the lower end of the ladder, makes contact with the terminal 39 on the ladder supporting upright 26, completing the circuit from conductor 79 through water pump motor 51 to the ground. The water pump motor 51 is thus operated only during the interval of time that the ladder is in its uppermost position.

Of course, as has been previously described, as the ladder rises, the means for lowering the hose end into the water trough is brought into play, so that when the pump 48 is operated a continuous stream of water is adapted to be discharged from the hose nozzle at the upper end of the ladder. The hose nozzle may be adjusted by the securing means 58 on the free end of the ladder to throw the stream of liquid into a suitable receptacle (not shown) or wherever desired. When the ladder is again lowered to its horizontal position, it actuates the hose-end raising device, and the hose end is again lifted out of the water trough.

During the time that motors 44 and 51 have been operating, the tractor motor 15 has been idle, because the collector 17 has been resting on the insulated sector 72 and

the circuit from contact shoe 20 has been broken.

As the ladder again assumes its lowermost position, in the manner hereinbefore described, contacts 43 and 41 are closed, completing the circuit from the shoe 20 and live rail 74, through the thermostatic switch 19, brake solenoid and tractor motor 15. Winding 87 of thermostatic switch 19 heats up, causing the flexure bar 86 to warp and short the bar and outlet terminal 88, permitting full current to flow through to the brake solenoid and motor 15. The brake is thus released and the motor started, propelling the toy apparatus away from the operating sector 72 and back to the fire house or to another operating sector. Although but one operating sector is described, it is obvious that as many of these may be provided as is desired.

The terminals of the thermostat 19 remain shorted until the apparatus has traveled away from the operating sector 72 and the collector 17 again makes contact with the live third rail 16. At this instant the circuit through the thermostatic switch 19 is broken as the collector 20 runs off and leaves the fourth rail 74.

From the foregoing detailed description and from the accompanying drawings, the construction, operation, and advantages of the improved electrical toy fire apparatus will be readily apparent.

While the construction herein shown and described is essentially of a preferred form, it will be understood that various modifications may be made therein, both as to details of construction and arrangement of the different units of the apparatus in their coordinated relations without departing from the underlying principles and the spirit of the invention as defined in the appended claims.

I claim:

1. In an electrical toy railway comprising a pair of main rails and a third rail having an insulated section, a fourth rail adjacent said insulated section and electrically connected thereto, a motor toy adapted to be mounted on said main rails and having a collector adapted to engage said third rail, automatic circuit controlling means carried by said toy, and an auxiliary collector electrically connected to said circuit controlling means and adapted to engage said fourth rail.

2. In a toy railway fire apparatus having a propelling motor and normally inoperative hose elevating and discharge means, main rails on which said apparatus is adapted to ride, a live rail having an insulated section, collector means adapted to engage said live rail to deliver current to said propelling motor, circuit controlled means electrically connecting said propelling motor and said hose elevating and discharge means, and additional collector means electrically connected to said circuit controlling means and adapted to engage said live rail as said first named collector engages said insulated section.

3. In an amusement device, in combination, a trackway comprising main rails, a live third rail having an insulated section, a live fourth rail adjacent said insulated section, a wheeled toy adapted to be propelled along said trackway, said toy comprising a tractor motor, a ladder-operating motor, and a pump-operating motor, and means carried by said toy and adapted to deliver current in a predetermined relation from said third and fourth rails to said motors.

4. In a wheeled toy, means to propel said toy along a trackway, means to automatically stop said toy at a predetermined section of said trackway, a ladder pivotally supported on said toy, pumping means on said toy, a hose having its nozzle end carried by said ladder and being operatively connected to said pumping means intermediate its ends, the other end of said hose being free, means on the toy an operative only at said predetermined section to raise and lower said ladder, means operative only when said ladder is in raised position to operate said pumping means, and ladder-controlled means for connecting said free end of said hose with a source of liquid.

5. In a toy motor control system, three motors, means to deliver current to each of said motors only when the other two are not running, a toy element adapted to be actuated by one of said motors, said element being adapted to control the flow of current to said motors.

6. In a device of the character described, a plurality of motor circuits each including a thermostatically-operated switch, a toy element adapted to control each of said circuits, means carried by said toy element adapted to complete one of said circuits to energize its switch just before the other circuit is broken and its switch de-energized.

7. In an amusement device having an operating section, means to propel a toy element to said operating section, means for automatically stopping said element at said operating section, means for elevating and lowering said element relative to said section and discharging a stream of fluid therefrom when raised, and means controlled by said element to automatically cause said element to be moved away from said operating section upon the completion of said cycle of operations.

8. In a toy motor propelled fire apparatus, normally inoperative hose elevating and discharge means carried thereby, means for

guiding said apparatus and supplying current to said toy motor, auxiliary current supply means disposed adjacent said guiding means, and means carried by said apparatus and electrically connected to said hose elevating and discharge means adapted to engage said auxiliary current supplying means.

9. In a toy motor propelled fire apparatus, normally inoperative hose elevating and discharge means carried thereby, rails for guiding said apparatus and supplying current to said toy motor, an insulated section connected in said rails, auxiliary current supplying means disposed adjacent said insulated section, and automatic circuit controlling means for said toy motor, and hose elevating and discharge means adapted to engage said auxiliary current supplying means.

10. In a toy motor propelled fire apparatus normally inoperative hose elevating and discharge means carried thereby, means for guiding said apparatus and supplying current to said toy motor, and means for controlling the supply of current to said toy motor and said hose elevating and discharge means, whereby said apparatus may be stopped and said hose elevating and discharge means operated.

11. In a toy motor propelled fire apparatus, ladder elevating means carried thereby, a ladder operatively carried by said elevating means, pumping means on said apparatus, a hose carried by said ladder and connected to the discharge side of said pumping means, a suction hose connected to the inlet side of said pumping means, and means operable on raising and lowering said ladder to lower and raise said suction hose.

12. The combination with a vehicle guideway, of current-carrying means substantially coextensive with said guideway and having an insulated portion, auxiliary current-carrying means disposed adjacent said guideway and substantially coextensive with said insulated portion, a current collector adapted to contact with said current-carrying means, and a secondary collector adapted to contact with said auxiliary means.

13. A toy fire apparatus comprising a tractor and a trailer, said trailer including a pivotally-mounted ladder, means for raising and lowering said ladder, a hose carried by said ladder, and ladder-actuated means for causing a stream of fluid to be discharged from said hose.

14. In a toy water-tower, a pivotally-mounted hose-carrying ladder, means to raise and lower said ladder, and means adapted to discharge a stream of fluid from said hose only when said ladder is in its uppermost position.

15. In a device of the class described, guiding means, a fire apparatus adapted to be propelled along said guiding means, a fire-house covering a section of said guiding means and adapted to receive said apparatus, means to automatically stop said apparatus in said section, and means to automatically restart said apparatus.

16. In combination, guiding means, a toy fire apparatus adapted to be propelled along said guiding means, a fire-house enclosing a section of said guiding means and adapted to house said apparatus, yieldably swinging doors on said house, and means surrounding said apparatus adapted to engage said doors to open the same and hold them open and clear of the body of the apparatus as the apparatus enters or leaves the fire-house.

17. An electrical toy fire apparatus comprising in combination, a chassis, a ladder mounted on said chassis, a hose carried by said ladder and having a nozzle at one end thereof, the other end of said hose being free, a trough into which said free end is adapted to be lowered, and means for lowering said end into said trough.

18. The combination set forth in claim 17, said means being ladder-controlled.

19. In a device of the class described, a chassis, a hose carried by said chassis having a free end, a liquid-containing receptacle into which said free end is adapted to be lowered, and means on said chassis for lowering said end into said receptacle.

In testimony whereof I affix my signature.

HARRY E. LOVING.