Nov. 18, 1969 M. APPEL 3,478,464

TOY TOLL BOOTH

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FIG. 2

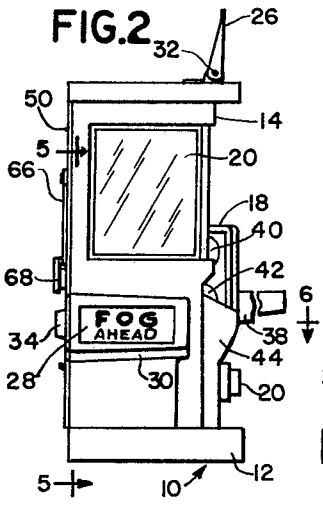


FIG. 1

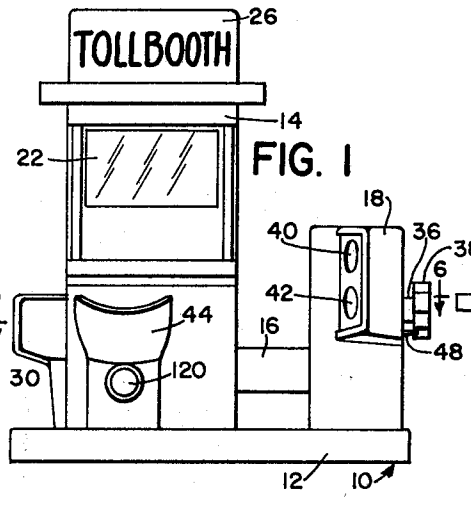


FIG. 3

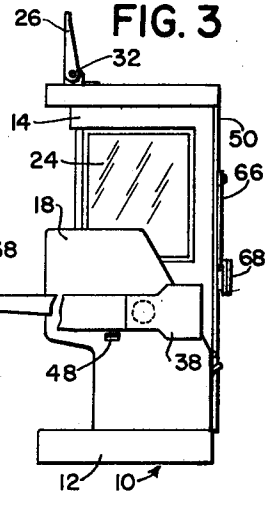


FIG. 4

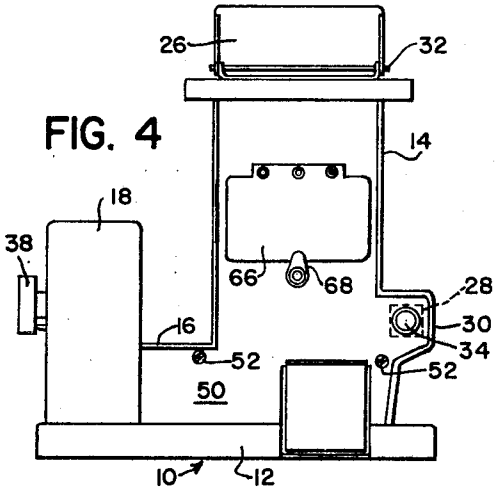


FIG. 7

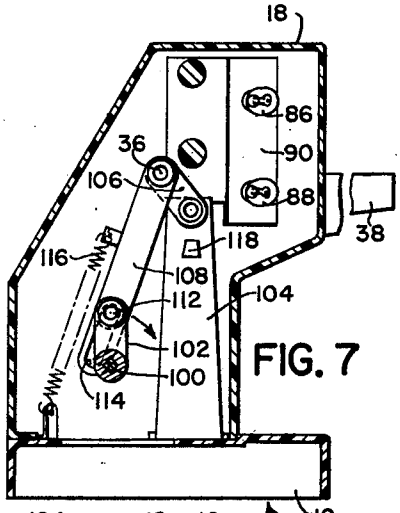
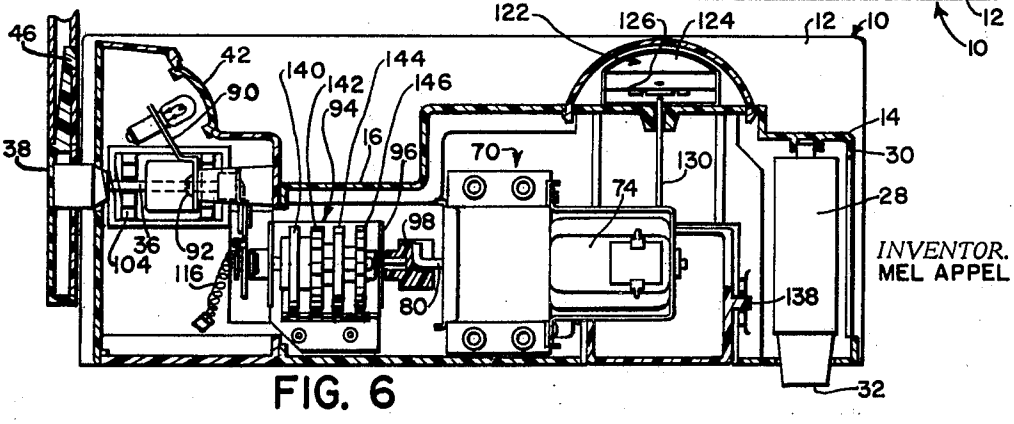


FIG. 6



INVENTOR.
MEL APPEL

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TOY TOLL BOOTH

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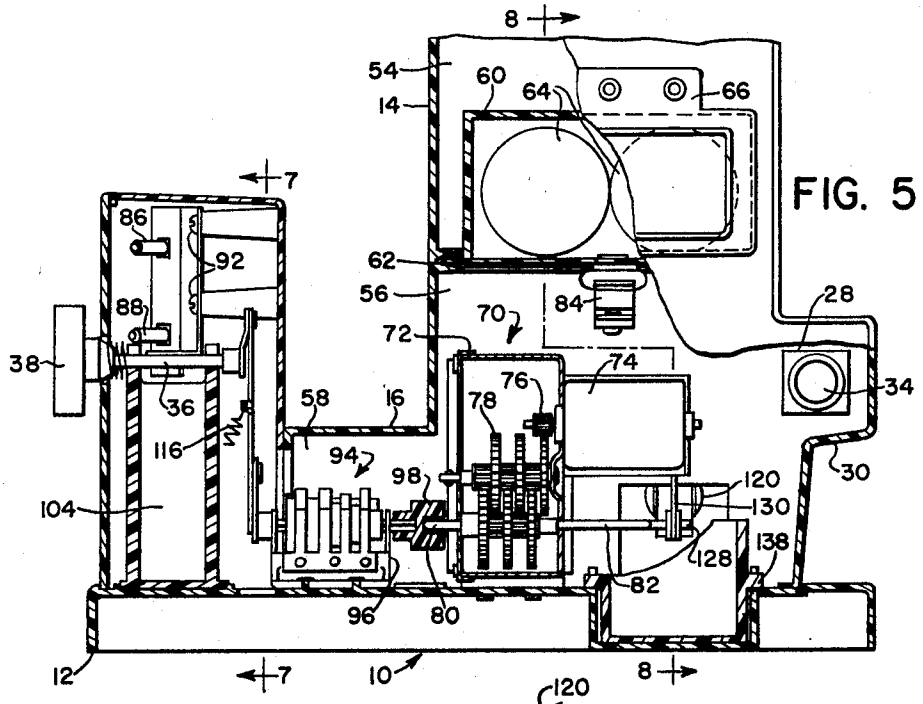


FIG. 5

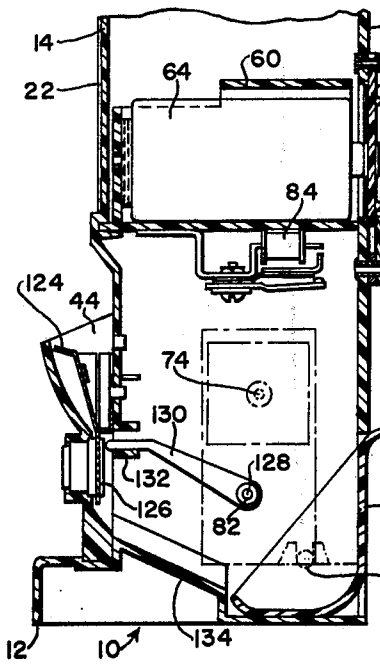


FIG. 8

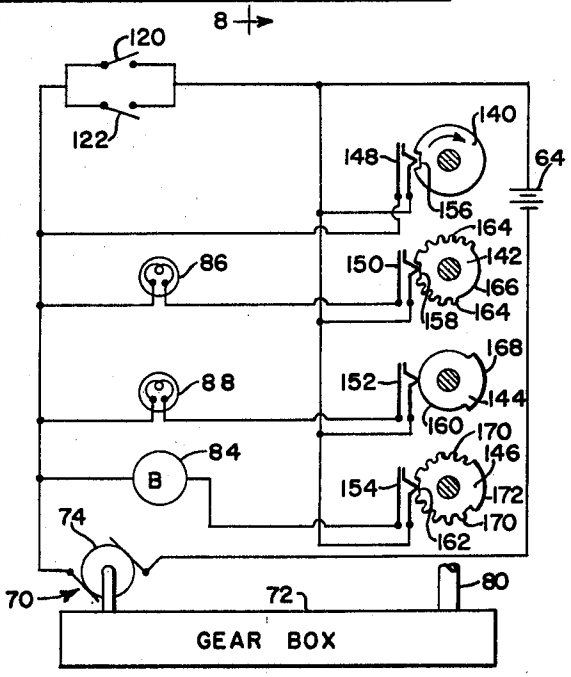


FIG. 9

INVENTOR.
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3,478,464

TOY TOLL BOOTH

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Int. Cl. A63h 29/22
U.S. Cl. 46—12 20 Claims

ABSTRACT OF THE DISCLOSURE

A toy useful for the simulated toll regulation of toy vehicular, etc. traffic and including a power operated extendible and retractable toll gate carried by a simulated toll booth preferably electrically operated and incorporating visual and/or audible signal means, the whole being selectively controlled by push button or coin operation.

BACKGROUND OF THE INVENTION

The toy is useful alone or in sets as an accessory or adjunct to the use of well known types of scale-model toys, particularly automobiles, motor trucks, etc. and enables the simulation of turnpikes, toll roads and other traffic and travel conditions rendered possible by the relatively widespread manufacture and sale of scale-model vehicles, most of which substantially faithfully represent their full-size counterparts and add realism to the play environment. Known prior art seems to be represented by manually operated devices or such electrical units as crossing gates and the like found in association with model railroads. These and variations thereof have been found unsuitable for present purposes.

SUMMARY OF THE INVENTION

The present invention provides a support in the form of a toll booth or house adapted to rest on the floor or ground adjacent to a path over which toy traffic is to travel, and the booth includes associated structure which mounts a toll gate for vertical swinging between path-blocking and path-unblocking positions and return. Electrically powered drive mechanism operates the gate thru a cycle including the aforesaid swinging and return of the gate, a delay interval being automatically incorporated when the gate is extended or raised so as to allow the passage of traffic before the gate descends. The unit is equipped with both visual and audible signals that function during gate movement. The device may be selectively energized by either a manual means such as a control button or by insertion of a "toll coin." One cycle of operation occurs each time the drive mechanism is energized and means is provided for automatically de-energizing the unit at the completion of each cycle. The structure is compactly designed and encloses all electrical and driving parts, it may be easily and inexpensively constructed of well known toy materials, such as metal, plastic or a combination of the two, and lends itself to attractive colors and configurations so as to result in a highly attractive, useful and durable toy.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front view of the toy;

FIG. 2 is a view of one end of the same;

FIG. 3 is a view of the opposite end;

FIG. 4 is a rear view;

FIG. 5 is a section substantially along the line 5—5 of FIG. 2;

FIG. 6 is a section substantially along the line 6—6 of FIG. 1;

FIG. 7 is an enlarged section along the line 7—7 of FIG. 5;

FIG. 8 is a section along the line 8—8 of FIG. 5; and

FIG. 9 is a schematic incorporating a wiring diagram.

DESCRIPTION OF A PREFERRED EMBODIMENT

The toy comprises a basic support **10** adapted to rest upon the ground or floor in adjacent relationship to a simulated traffic path or road and includes a base **12** and three housing portions **14**, **16** and **18**, the portion **14** being in the form of a typical toll booth or house, the portion **18** being in the nature of a standard and the portion **16** serving to interconnect the two portions **14** and **18**. These housing portions are all hollow and enclosed to house the working components of the unit, as will be described later. The toy is made to a somewhat small scale, being on the order of nine inches in height, eight inches in length and a little less than four inches in depth. Its use with similarly scaled toys will be readily apparent without further illustration or description and the presence of a toll road, turnpike and toy traffic thereon can be readily assumed. To further enhance the attractiveness and realism of the toy, the booth portion **14** may include simulated windows **20**, **22** and **24**; a roof sign **26**, bearing any suitable designation as suggested in the drawings; and a selectively settable rotatable traffic-condition-indicating sign **28** rotatably carried in a box extension **30** integral with the booth **14**.

The roof sign **26** is preferably hinged at **32** for folding to facilitate packaging of the toy for shipment. The condition sign **28** may be of rectangular section to bear four different warnings, only one of which is suggested in FIG. 2, and may be turned and set by a hand knob **34**. The entire toy may be constructed of well-known toy manufacturing materials such as sheet metal and plastic or a combination of the two and as such may be easily manufactured by conventional methods for low-cost distribution and sale.

The housing portion or standard **18** serves to mount, by means including a horizontal shaft **36**, a toll gate **38** movable between an extended traffic-blocking position and a retracted traffic-unblocking position and return, the movement in this case being swinging about the axis of the gate shaft **36** so that the gate in its extended position projects horizontally across the traffic path (FIGS. 1, 2 and 3) and the retracted position is a raised position in which the gate swings 90° upwardly from its blocking position to an upright position, not shown but readily apparent. The standard also includes first and second visual signal means, here including an upper red or "stop" light **40** and a lower green or "go" light **42**. As will be brought out below, during raising movement of the gate, the red light will flash, when the gate is up the green light will glow steadily, and as the gate is returning to its horizontal position the red light will flash again while the green light shuts off. Realism is further imparted by the provision on the front of the booth **14** of a coin collection box or basket **44**. As best shown in FIG. 6, the gate may be of two-piece construction in which the longer part is separable from the remainder adjacent to the shaft **36** for again facilitating packaging. A representative snap connection is illustrated at **46**. A stop **48** projecting externally from the standard **18** limits up and down movement of the gate.

The housing structure may be largely of one-piece molded plastic construction, at least as to the portions **14** and **16** and these are hollow and have an open back normally closed by a cover **50** removably secured in place by screws **52**. As shown in FIG. 5, the both **14** has upper and lower compartments **54** and **56** and the intervening portion **16** provides a compartment **58**. Separation of the booth compartments **54** and **56** is achieved by the floor of a battery cage **60** having flanged edges slidably received

in grooves in each of the opposed walls of the booth, one of which grooves is shown at **62**. The cage **60** carries in typical fashion a pair of side-by-side conventional batteries **64** serving as the source of electrical energy for powering the working parts of the toy. When the cover **50** is in place, a hinged door **66** thereon, normally retained closed by a latch **68**, is in register with the battery cage to permit removal and replacement of batteries.

Housed within the lower booth compartment **56** is drive mechanism **70** carried by a metal chassis **72** and including a small electric motor **74**, having a drive pinion **76**, and gear-reduction means **78** including an output shaft **80** extending toward the gate **38** and an auxiliary shaft **82** extending coaxially in the opposite direction. The battery cage has beneath it a buzzer **84**, representative of an audible signal means coordinated with movement of the gate as will appear later. The red and green lights **40** and **42** are intermittently illuminated by small lamps **86** and **88** mounted in a supporting plate **90** secured within the standard **18** as by screws **92** threaded into appropriate bosses as shown (FIGS. 5, 6 and 7). The wires to the electrically operated parts have been omitted in all but the wiring diagram of FIG. 9, which will be explained later, in the interests of avoiding confusion among the mechanical parts.

A rotary drum structure **94**, incorporating electrical switch means to be presently described, is rotatably journaled on a portion of the base **12** within the housing **16** coaxially with the drive mechanism shaft **80**, the journaling being accomplished by suitable apertured ears **96** secured to and rising from the base (FIGS. 5 and 6), and the drum **94** is coaxially and drivingly coupled to the shaft **80** by a coupling **98** so that the shaft **80** and drum rotate in unison in a clockwise direction as seen in FIG. 7.

The drum **94** includes a coaxial shaft extension **100** to which is affixed a crank arm **102**. The gate shaft **36** projects interiorly of the housing standard **18** in upwardly spaced parallel relation to the shaft **100** and is journalled in the upper bifurcated ends of an upright support **104** fixed to and rising from the base **12**. The inner end of the gate shaft **36** has affixed thereto a crank arm **106** pivotally connected to the upper end of a link **108**. The lower end of the link is connected to the crank arm **102** by lost-motion means including a pin **112** and slot **114**. A light tension spring **116** is connected between the link and the base as shown and exerts a downward force on the link and thus on the arm **106** so as to bias the gate shaft in a counterclockwise direction as viewed in FIG. 7. These force and motion characteristics are of course consistent with raising of the gate and the spring **116** therefore functions as means for biasing the gate to its raised or retracted condition. In the starting position of the parts, when the gate is horizontal or extended, the crank **102** is upright or substantially so and the top end of the slot **114** seats on the pin **112** in the crank **102** so that the spring force cannot raise the gate **38** by turning the gate shaft **36**, because the motor **74** is not energized at this time and the spring force is not sufficient to overcome the stationary reduction gearing **78**. Therefore the gate remains in its horizontal position until the motor **74** is energized.

When the motor is thus energized, by means to be later described, the crank pin **112** travels to the right and downwardly (clockwise) as seen in FIG. 7 and the spring **116** causes the link **108** to follow this pin, thus effectuating the force that raises the gate **38**. As the pin **112** thus rotates farther in its clockwise direction it continues to be followed by the link **108** until, at about one-fourth of its revolution, the pin is still at the top of the link slot but the movement is enough so that the spring **116** has raised the gate to its vertical position, the gate shaft crank **106** thus moving 90° and engaging a stop **118** on the support **104**. While the spring **116** continues to hold the gate upright, the motor **74** continues to run and the crank pin **112** travels through about another one-half revolution, at which time the pin increasingly moves away from and then back toward the top end of the link slot **114** until at about three-fourths of its total arcuate travel it again picks up the top end of the link slot and establishes a positive compression force in the link **108** between the crank pin **112** and the gate shaft crank **106**, thus driving the gate shaft in a reverse or clockwise direction and thru 90° back to its starting or horizontal position.

In brief, as the motor shafting drives through 360° in a clockwise direction as seen in FIG. 7, the gate shaft turns first 90° in a counterclockwise direction to raise the gate, then delays while the gate is up and finally reverses through 90° to lower the gate. The time interval or delay between one-fourth and three-fourths of a revolution of the motor driven crank **102** and its pin **112** represents the time that the gate remains in its raised position, providing ample time for traffic to pass the raised gate before the gate returns to its lowered position. In other words the crank-link-slot mechanism provides delay means operative after raising of the gate so as to prevent its immediate return to its horizontal position while the motor **74** continues to run, this delay being effected by a combination of the spring **116** acting to bias and hold the gate upwardly and the lost motion means at **112**-**114** which enables the motor to continue to drive in the delay interval until the crank pin **112** eventually picks up the link **108** and gate shaft crank **106** to return the latter to its starting position against the bias of the spring, at which point the drive mechanism rests until re-energized, as will appear below.

One of the features of the invention resides in the provision of control means including a pair of selectively or alternatively actuable devices or switches for energizing the motor **74** and the allied electrical signals, together with means for automatically de-energizing the mechanism after each complete cycle in which the gate moves from its starting or extended position to its retracted or raised position and returns to its starting position, and this in combination with the delay means in which the result achieved is that, after a toll is "paid," the gate remains up until the toll payer "drives" his vehicle past the raised gate, after which the gate lowers and blocks the next vehicle.

One of the control devices or elements is a manually operable or push button controlled switch **120** mounted on the box or basket **44**, and the other of the devices or elements is actuated by a coin or similar metallic object so that realism is added to the toy and its operation. The coin switch is designated in its entirety by the numeral **122** and includes a semi-cup shaped metallic element **124** affixed within the coin basket or box **44** and including a depending metallic spring leaf **126** in the path of the push button **120** (FIG. 8). The metallic auxiliary shaft **82**, previously described as projecting from the gear box or reduction means **78**, has a cranked end **128** to which is pivoted a metallic finger **130** that projects slidably through an aperture **132** in the front wall of the booth **14** and into close proximity to the depending metallic leaf **126** (FIG. 8). This finger is in electric circuit with the batteries, as is the leaf **126**, so that two modes of operation are possible: First, if the button **120** is pressed inwardly, it engages the leaf **126** and presses it into electrical contact with the free or basket-proximate end of the finger **130**, completing the circuit that energizes the motor **74** and the rest of the electrical components; second, if a coin or like metallic object is dropped into the basket or box **44**, it bridges between the metal liner or element **124** and the finger **130** and likewise completes the motor circuit.

It will be seen that the finger **130**, projecting almost all the way into the basket and just short of the leaf **126**, divides the lateral width of the box **44** into two areas less than the diameter of the coin to be received (preferably a U.S. one-cent piece), and the spacing between the terminal ends of the finger **130** and the leaf

126 is less than the thickness of the coin. Thus, without more, the coin will be retained and will keep the circuit closed. However, this result is avoided and a means is provided to collect the "paid tolls." This is accomplished as follows: As the motor **74** is energized to drive the gear reduction means **78**, the shaft **82** is driven and its cranked or bent end **128** retracts the finger **130** from the leaf **126** so as to release the coin to a base-contained ramp **134** that leads to a receptacle **136** (FIG. 8) that is pivotally carried at **138** by the unit for rearward rocking to enable the "tollkeeper" to collect the deposited tolls.

To complete the operating mechanism and to accomplish automatic functioning, including de-energizing of the motor **74** after each complete cycle of the gate, as well as appropriate operation of the signal means **84**, **86** and **88**, the rotary switching means including the drum **94** is brought into play. The drum preferably comprises a one-piece member constructed of suitable non-conducting plastic material affixed to the drum shaft **102** and including four axially spaced cams or actuators **140**, **142**, **144** and **146** associated respectively with normally biased-open switch means **148**, **150**, **152** and **154**, connected into the electrical circuit as shown in FIG. 9, the details of which will be apparent without further description. The means **140–148** comprises the motor control means; the means **142–150** controls the red or "stop" lamp **86**; the means **144–152** control the green or "go" lamp **88**; and the means **146–154** serves the buzzer **84**.

The cams **140**, **142**, **144** and **146** respectively have notches or low areas **156**, **158**, **160** and **162** to assure that the respective switches **148**, **150**, **152** and **154** are open in the starting position of the unit, at which time the motor **74** is de-energized and the toll gate **38** is in its horizontal or blocking position. The red light cam **142** has sets of teeth **164** intervening between the notch **158** and an arcuate low area **166** of substantial extent. The green light cam **144** has a high area **168** substantially 180° from its low area **160**. The buzzer cam **146** has sets of teeth **170** at both sides of its notch **162** and an arcuate high area **172** intervening between these teeth.

OPERATION

As previously stated, the starting condition of the toy occurs when the gate **38** is in its down or blocking position and the motor **74** de-energized. All switches are open (FIG. 9). Initially, the motor **74** may be energized by either the manual switch **120** or the coin switch **122**, and the result is the same; i.e., the motor **74** begins to drive and the drum **94** is rotated, whereupon the motor cam **140** closes the sustaining switch **148** so that the circuit to the motor remains closed even though the switch **120** (or **122**) is released. In the case of coin operation via the switch **122**, the coin bridging the contacts represented by the leaf **126** and finger **130** will be released to the ramp **134** and receptacle or collector **138** as soon as the motor **74** starts to turn the shaft **82** enough to retract the finger **130**. In either event, the cam **140** will now be running with its high area closing the switch **148** and the motor will drive thru one complete revolution until the notch **156** in the motor cam **140** again allows the switch **148** to open, thus de-energizing the mechanism. During the one-revolution cycle of operation, the gate **38** will raise, will remain raised for a significant predetermined interval established by the design of the lost-motion means **102**, **108**, **112**, **114**, **116** etc., and will lower to again block traffic. As the gate starts to raise because of driving of the motor **74**, the drum **94** of course turns and the red light cam **142** presents one set of its teeth to the red light switch **150**, causing the latter to rapidly make and break to effect flashing of the red lamp **86**. At the same time, one set of teeth **170** on the buzzer cam **146** will sound the buzzer **84** intermittently, warning that the gate situation is such that passage is not clear. At about one-fourth of a revolution, when the gate **38** becomes raised according to the linkage means previously described, the red light cam presents its low area **166** and the red light switch **150** is opened. At the same time, the green light cam **144**, previously running on its low area **160**, now presents its high area **168** to close the switch **152** and the green lamp **88** glows steadily while the gate **38** remains in its up or retracted position; and the buzzer cam **146** simultaneously presents its high area **172** to hold the switch **154** closed so that the intermittent sound of the buzzer now becomes steady, signalling the "go" condition.

After the requisite delay of the gate in its "up" position, allowing the "toll-paying" vehicle to pass, the cams operate as follows: The green light cam **160** again presents its low area to the green light switch **152** so that the green light goes off; the red light cam **142** presents its other set of teeth **164** to the switch **150** so as to flash the red light as the gate descends; the buzzer **84** again sounds intermittently because the buzzer cam **146** presents its other set of teeth **170** to the switch **154** as the high area **172** ends, and the motor cam **140** approaches the condition in which its notch **156** finally causes biased opening of the motor switch **148**. Each cycle of operation is based upon the same pattern and each cycle involves one revolution of the motor shaft **80**.

I claim:

1. A toy for simulating the toll regulation of toy traffic along a path, comprising a support adapted to rest on the ground adjacent to such path, a toll gate, means mounting the gate on the support for movement between extended and retracted positions respectively blocking and unblocking the path, support-carried power-operated drive mechanism normally de-energized in a starting position with the gate in its extended position and energizable to operate continuously through a full cycle to leave and return to said starting position, drive means for moving the gate from its extended position to its retracted position and return to said extended position during each cycle of said drive mechanism, said drive means including delay means for retaining the gate in its retracted position for a predetermined significant interval while the drive mechanism continues through its full cycle and for incurring return of the gate to its extended position as the drive mechanism returns to its starting position, control means for energizing the drive mechanism to operate through one full cycle and thereby to move the gate from its extended position, and means for automatically deenergizing the drive mechanism upon completion of said cycle.

2. The invention defined in claim **1**, in which the support includes housing means enclosing the drive mechanism.

3. The invention defined in claim **1**, in which the housing is in the form of a simulated toll house.

4. The invention defined in claim **1**, in which the means mounting the gate on the support includes a horizontal shaft carrying the gate for upward and downward swinging between its extended and retracted positions and having a crank arm thereon, the drive mechanism includes a drive shaft parallel to the gate shaft and having a crank arm, and the delay means includes a link having pivotal connections respectively to the crank arms, one of said connections including a slot enabling continued rotation of the drive shaft and delayed rotation of the gate shaft.

5. The invention defined in claim **1**, in which the drive mechanism includes an electric motor connectible to a source of energy and the control means includes switch means electrically connectible and disconnectible between the motor and the source of energy.

6. The invention defined in claim **5**, in which the switch means includes a pair of normally open contacts and a control element movable to close the contacts.

7. The invention defined in claim **5**, in which the switch means includes a pair of normally open contacts

and means for receiving a metal object and for causing said object to bridge and close said contacts.

8. The invention defined in claim **5**, in which the switch means includes a pair of normally open contacts and a control element movable to close the contacts and means operative alternately with said element for receiving a metal object and for causing said object to bridge and close said contacts.

9. The invention defined in claim **5**, including first electric signal means operative in response to retraction of the gate, second electric signal means operative in response to return extension of the gate, and actuating means for causing alternate operation of the two signal means respectively according to the aforesaid movements of the gate and for deenergizing both signal means when the gate is in its extended position.

10. The invention defined in claim **9**, in which the actuating means includes a rotary drum having a plurality of cam means thereon and auxiliary electric switches operated respectively by the cam means.

11. The invention defined in claim **1**, in which the drive mechanism includes an electric motor connectible to a source of energy, the control means includes switch means electrically connectible and disconnectible between the motor and the source of energy and the means for automatically deenergizing the drive mechanism includes rotary normally open electrical switch means driven by the motor and adapted to close upon starting of the motor by the control means, to remain closed during the gate cycle and to re-open when the gate cycle is completed.

12. The invention defined in claim **5**, in which the support includes a housing containing the drive mechanism and battery means is contained within the housing as the source of electrical energy.

13. The invention defined in claim **12**, in which the housing is provided with separate compartments respectively for the drive mechanism and battery means.

14. The invention defined in claim **1**, in which the drive mechanism includes an electric motor connectible to a source of energy and the control means includes switch means electrically connectible and disconnectible between the motor and the source of energy, said control means including a pair of normally open contacts, means for receiving a metal object and for causing said object to bridge and close said contacts, and means driven by the motor for releasing said object from the contacts after the motor is energized.

15. The invention defined in claim **14**, including receptacle means for collecting the released object.

16. The invention defined in claim **15**, in which the receptacle is movably carried by the support to permit access to the collected object.

17. The invention defined in claim **1**, in which the drive mechanism includes an electric motor connectible to a source of energy, the control means includes switch means electrically connectible and disconnectible between the motor and the source of energy, first visual electric signal means operative in response to retraction of the gate, second visual electric signal means operative in response to return extension of the gate, third audible signal means operative during movement of the gate, and actuating means for causing operation of the audible signal means during extension and retraction of the gate, for causing alternate operation of the two visual signal means respectively according to the aforesaid movements of the gate and for deenergizing all three signal means when the gate is in its extended position.

18. The invention defined in claim **1**, in which the control means includes a pair of selectively operable control devices, one of said devices being coin-operated.

19. The invention defined in claim **1**, in which the delay means includes biasing means operative to move the gate to its retracted position, means driven by the drive mechanism for allowing the biasing means to move the gate to said retracted position and including lost-motion means enabling retention of said gate in said retracted position for the aforesaid interval and operative following said interval to return the gate to its extended position against the force of said biasing means.

20. The invention defined in claim **1**, in which the support includes a base, a first housing mounted on the base and simulating a toll booth, and a second housing mounted on the base in spaced relation to the booth and including the mounting means for the gate, said second housing further carrying signal means correlated with movement of the gate.

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ROBERT PESHOCK, Primary Examiner

ROBERT F. CUTTING, Assistant Examiner

U.S. Cl. X.R.

46—243; 49—35