Nov. 13, 1956 D. W. JONES ET AL 2,770,074

SELF PROPELLED TOY WHICH CIRCUMVENTS OBSTRUCTIONS

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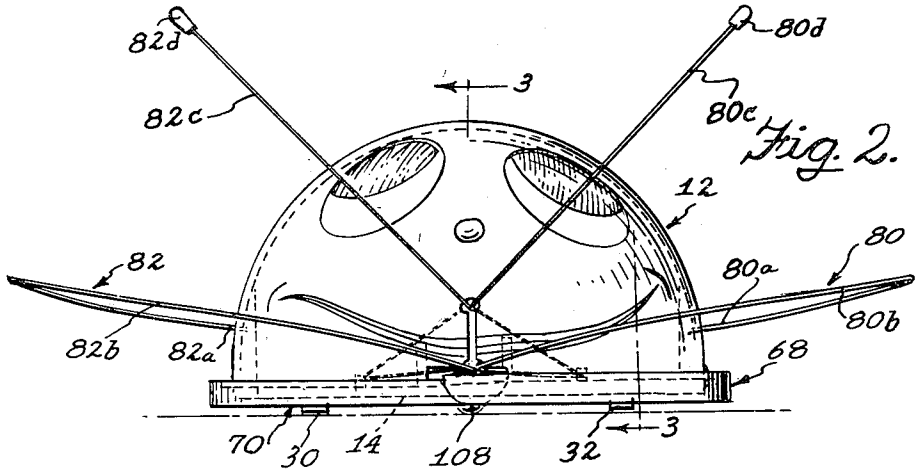



Fig. 2.

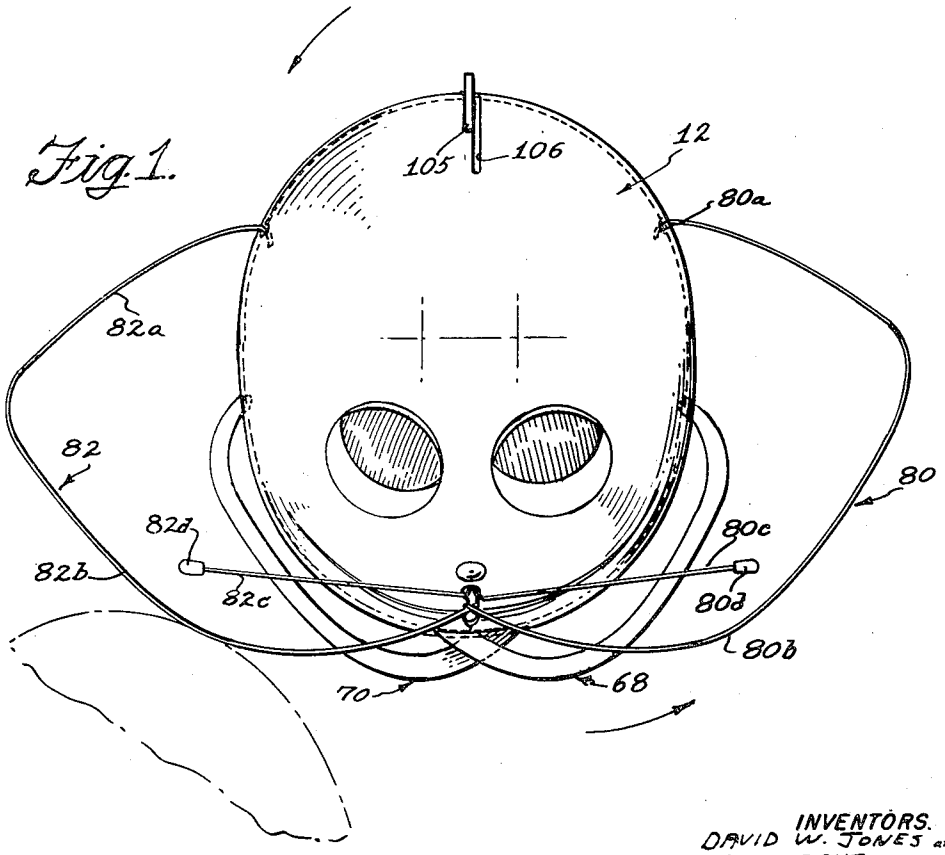



Fig. 1.

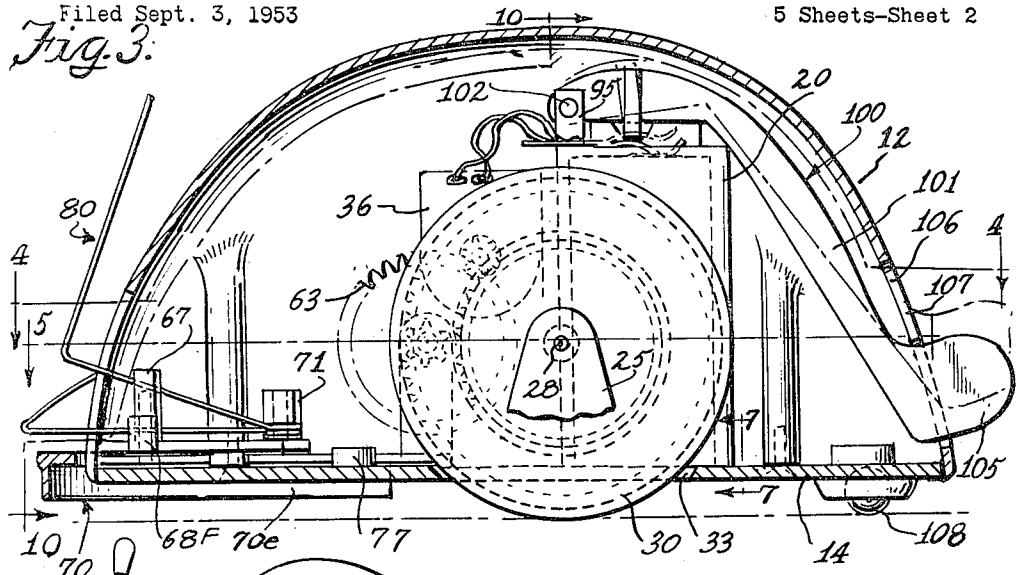
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Fig. 3.



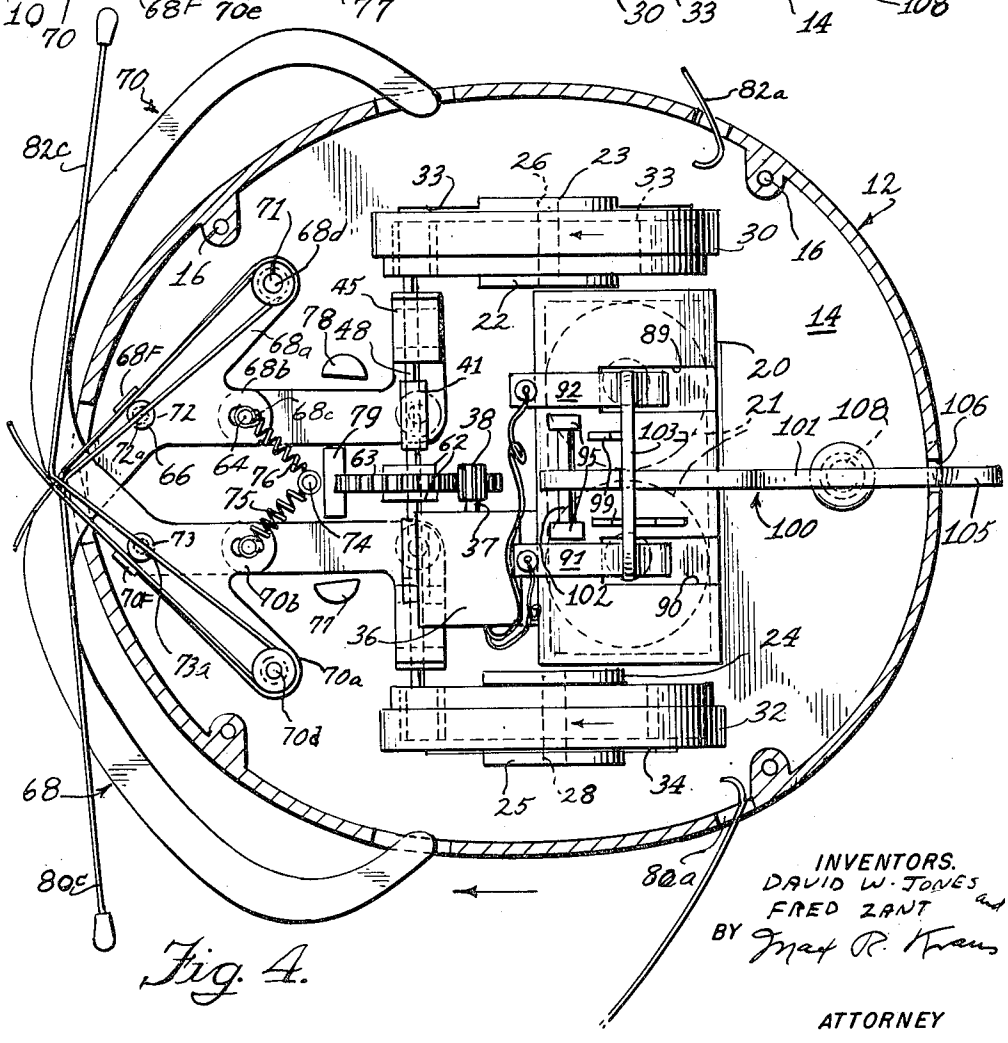




Fig. 4.

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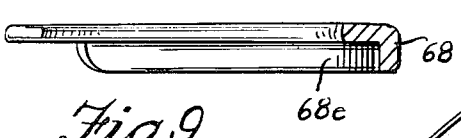



Fig. 9.




Fig. 5.

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Fig. 6.

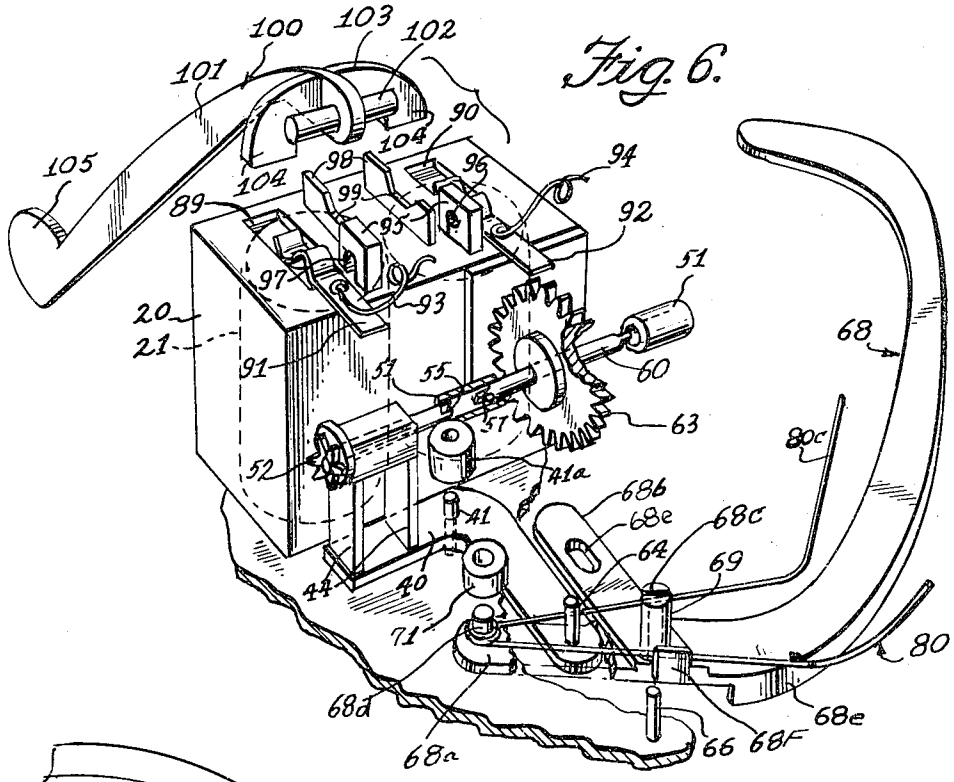
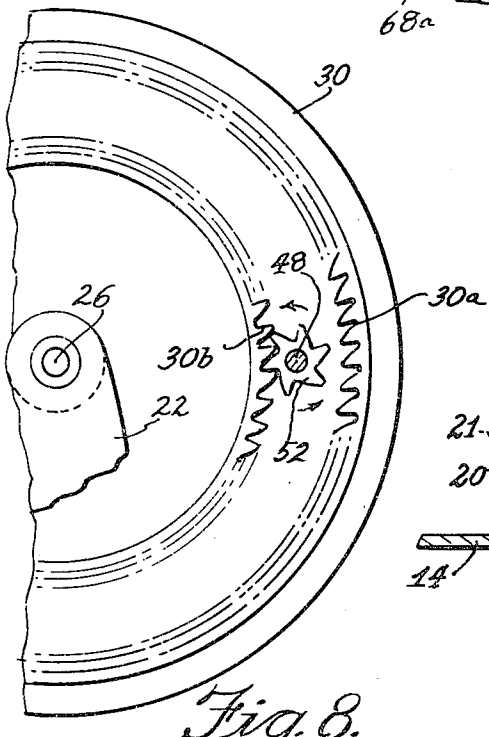



Fig. 7.



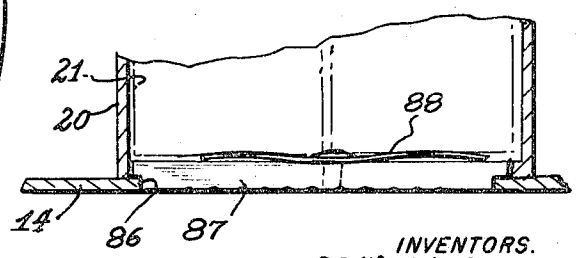




Fig. 8.

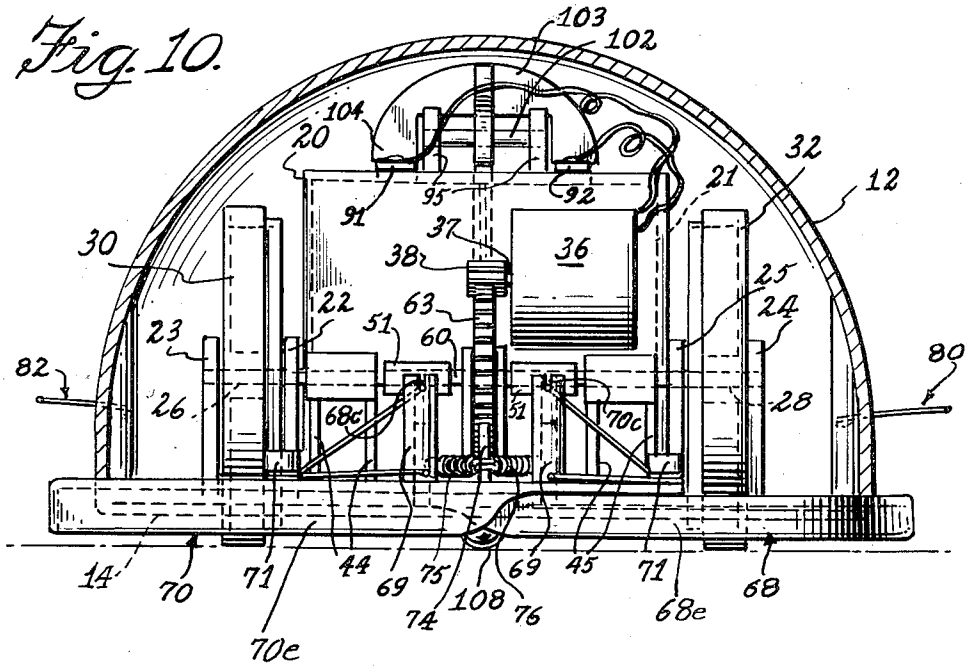
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Fig. 10.



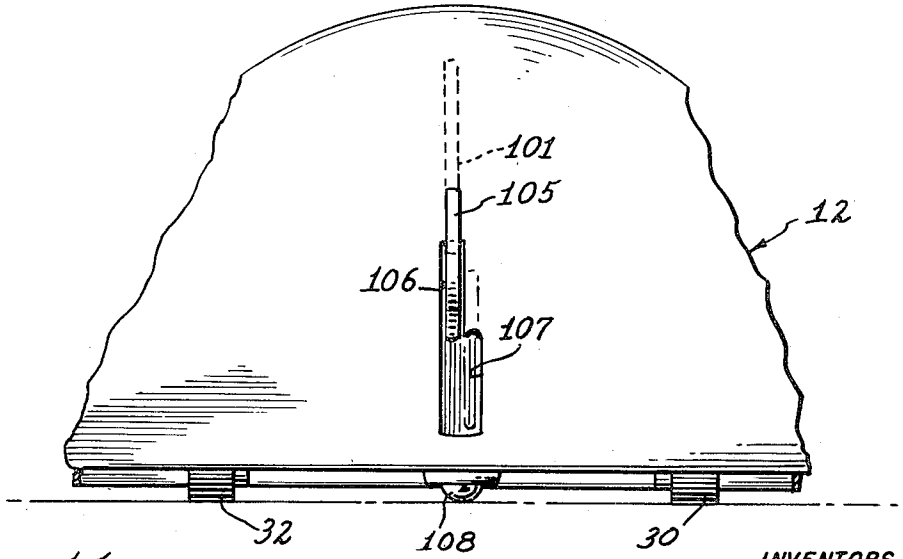




Fig. 11.

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United States Patent Office 2,770,074 Patented Nov. 13, 1956



2,770,074

# SELF PROPELLED TOY WHICH CIRCUMVENTS OBSTRUCTIONS

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Application September 3, 1953, Serial No. 378,326

10 Claims. (Cl. 46—247)

This invention relates to toys and more particularly to an automatically self-propelled toy which is caused to move continuously over a surface and change its direction of travel upon encountering an obstruction.

One of the objects of this invention is to provide a self-propelled toy which may be operated by a dry cell battery or other mechanical means and which is caused to move or travel is a continuous manner over a surface and automatically change its direction of travel when it encounters an obstruction in its path of travel.

Another object of this invention is to provide a self-propelled toy which is adapted to move continuously over a surface, the said toy having means projecting therefrom adapted to engage or contact any obstruction in the path of its travel and automatically effect a turning or reversing thereof to avoid the obstruction whereby it continues to travel in another direction.

Another object of this invention is to provide a toy which may be made in the representation of an insect or the like and simulate the same, constantly moving and changing its direction of movement as it meets with an obstruction in its path of travel.

The toy of this invention is highly amusing and interesting as well as mystifying. When the driving means is placed in operation, the toy will move substantially in a straight path until it encounters an obstruction in its path, at which time it will automatically change its direction of travel. For example, if the toy while moving strikes a wall or a leg of a chair or table or any object, it will change its direction by turning away from the obstruction and continue in another direction substantially in a straight line until it strikes another obstruction, and again changes its course. Thus, the movement of the toy is never arrested. The toy when started may thus move constantly in any direction dependent upon the position of the obstruction and will continue to operate and move until the driving mechanism is arrested as by manual manipulation or for other reasons. The driving means may comprise a spring wound motor or a battery-driven electric motor. With a pair of conventional flashlight dry cells the toy may operate continuously for a period of 6 hours or longer, and the dry cells may be readily replaced when exhausted.

Fig. 1 is a top plan view of the toy.

Fig. 2 is a front elevational view of the same.

Fig. 3 is a cross sectional view taken on line 3—3 of Fig. 2.

Fig. 4 is a cross sectional view taken on line 4—4 of Fig. 3.

Fig. 5 is a cross sectional view taken on line 5—5 of Fig. 3.

Fig. 6 is an exploded perspective view of the operating mechanism.

Fig. 7 is a cross sectional view taken on line 7—7 of Fig. 3.

Fig. 8 is a cross sectional view taken on line 8—8 of Fig. 5.



Fig. 9 is a cross sectional view taken on line 9—9 of Fig. 5.

Fig. 10 is a cross sectional view taken on line 10—10 of Fig. 3.

Fig. 11 is a rear elevational view of a portion of the housing.

Referring to the drawings the toy comprises a dome shaped housing 12 in the caricature of a bug or the like, the same being substantially oval shape in plan and supported on an oval shaped base 14 removably secured thereto by suitable screws 16. Supported upright on the base 14 is a compartment 20 adapted to contain a pair of flashlight dry cells 21. Two pairs of spaced journal members 22, 23 and 24, 25 are mounted on the base on opposite sides of the dry cell compartment. Axles 26 and 28 are journaled respectively in pairs of members 22, 23 and 24, 25 and wheels 30 and 32 are supoprted on axles 26 and 28 respectively.

The base 14 is provided with a pair of longitudinal slots 33 and 34 through which project the lower portions of wheels 30 and 32 respectively. As seen more clearly in Fig. 8 each of said wheels is provided within the tread thereof with two concentric annular series of gear teeth, the outer series being indicated by the numerals 30*a* and 32*a* and the inner series by the numerals 30*b* and 32*b*.

A miniature electric motor 36 is secured to the forward wall of the dry cell compartment 20 (Fig. 4) and fixed on the motor shaft 37 thereof is a pinion 38.

As seen more clearly in Figs. 5 and 6 a pair of bell-crank levers 40 and 42 are supported on the base 14 for pivotal movement about vertical studs 41 and 43 respectively surmounted by caps 41*a*. Mounted on the bell-crank levers 40 and 42 are pairs of spaced upright members 44, and 45 respectively on which are journalled shafts 48 and 50 respectively. On the outer ends of the said shafts are mounted pinions 52 and 54, which are adapted to selectively engage with one of the annular series of gear teeth on the wheels as will be hereinafter explained. The inner ends of each of the said shafts are bifurcated as at 55 to cooperatively engage correspondingly bifurcated ends 57 of a shaft 60, presently to be described. This arrangement provides joint couplings between shaft 60 and shafts 48 and 50 so as to permit angular shifting of shafts 48 and 50 with respect to the axis of shaft 60. Sleeves 51 loosely fit over each of the coupled joints and serve to retain the same in engagement while permitting angular shifting.

The shaft 60 is journalled in a pair of spaced upright members 62 mounted on the base 14. A gear 63 is fixed to the shaft and is in operative engagement with the motor driven pinion 38.

Each of the forwardly directed arms of the bellcrank levers 40 and 42 carries an upright pivot pin 64. Mounted on the base 14 are a pair of pivot pins 66 and 67 which are positioned forwardly of said arms. A pair of complemental rigid feeler arms generally designated by the numerals 68 and 70 and shaped substantially as illustrated in Figs. 5 and 6 are pivotally supported on said pins 66 and 67 respectively. The said arms have substantially Y-shaped inner end portions consisting of branches 68*a* and 68*b* and 70*a* and 70*b* with the branches 68*b* and 70*b* having slots 68*e* and 70*e* through which the pins 64 pass effecting a pivotal connection. The branches 68*a* and 70*a* each have upright posts 68*d* and 70*d* respectively at their ends each accommodating a sleeve 71. Sleeves 69 are carried on each of the pins 66 and 67 and are slotted at their upper ends as at 68*c*. The outer end portions of the rigid feeler arms 68 and 70 each sweep outwardly in a curve and then inwardly with the terminal portion of each arm received in a recess or opening in a respective side of the housing. As best seen in Figs. 4 and 5 the feeler arms are positioned with one crossing

over the other and with the outer arm portions sweeping in opposite directions and projecting forwardly and sidewardly beyond the shell housing. The feeler arms have downwardly extending flanges 68*e* and 70*e* respectively.

Mounted on the base 14 and positioned between the bellcrank levers 40 and 42 is a pin 74 to which are secured two tension coil springs 75 and 76, the opposite ends of said springs being in turn secured to the pins 64. The springs normally urge the bellcrank levers inwardly to the positions illustrated in Fig. 4 wherein the forwardly directed legs are parallel to each other. Correspondingly the rigid feeler arms 68 and 70 are urged outwardly. Abutments 77, 78 and 79 mounted on the base 14 serve to limit the range of movement of the bellcrank levers so that the pinions 52 and 54 will effect proper selective operative engagement with either the inner or outer series of annular gear teeth of each wheel.

Each of the feeler arms 68 and 70 carries an auxiliary resilient wire feeler member, generally designated by the numerals 80 and 82 respectively. These serve when engaging an obstruction to actuate a respective rigid feeler arm. Since both auxiliary feeler members are of identical complemental construction only one will be described. The feeler member 80 for example, is shaped substantially as illustrated in Fig. 5, and includes an outer portion 80*b* sweeping in a wide curve around the side of the housing 12 from the front to the rear, the terminal portion of the member 80 passing through an opening 80*a* in the side of the housing and being loosely retained therein. The member 80 continues inwardly through an opening in the front of the housing and then rearwardly substantially parallel to the rigid feeler member 68, passing between abutment 68*f* and sleeve 69. The member 80 is wrapped around and secured to pin 68*d* by sleeve 71. It then continues forwardly substantially parallel to the feeler member 68 received in slot 68*c* and then upwardly and outwardly through the housing extending above the housing as best shown in Figs. 2 and 5, the terminal portion 80*c* being surmounted by a knob 80*d* or the like. The feeler member 80 and 82 cross over each other forwardly of the housing.

A pair of flashlight dry cells 21 are contained within the compartment 20. The said dry cells may be inserted through a rectangular opening 86 in the bottom of the compartment. A bottom closure plate 87 is removably secured to the base as shown in Fig. 7. The plate has a metal spring clip 88 which engages the negative terminals of the dry cells. The top of the compartment is provided with a pair of rectangular shaped openings 89 and 90 through which the positive terminals of the dry cell protrude. A pair of spring electrode arms 91 and 92 are mounted at one end on the top of compartment 20, the end portions of said arms being shaped in ogee configuration and being alined with the positive terminals to make contact therewith only when the switch member is actuated. The electrode arms are connected by electrical wires 93 and 94 to the motor 36.

The top of the compartment 20 supports a pair of spaced uprights 95 which are provided with an opening 96 and a slot 97. A pair of guides 98 are secured to the top of the compartment 20 between the uprights 95 and guides have recesses 99. The switch actuator member generally indicated at 100 comprises an arm 101 which is curved adjacent the top and supports a transverse pin 102, which pin is secured in the slot 97 and opening 96 of the uprights 95.

A cross member 103 is secured to arm 101 with the legs 104 of said cross member being adapted to engage the ends of the electrode arms 91 and 92. The arm 101 has a rear extension 105 which projects through a slotted opening 106 in the rear of the housing. The slotted opening 106 has a notch 107 which is adapted to be engaged by the arm 101. When the arm 101 is rocked downwardly and shifted laterally so that it is locked in the notched opening 107, the cross member will bear down on the spring electrode arms 91 and 92 so that they may contact with the dry cell terminals, thus closing a circuit and causing the motor 36 to operate. When the arm 101 is shifted laterally so as to be free of the notch 107, the spring electrode arms will urge the arm 101 upwardly and break contact with the dry cell terminals rendering the motor inoperative.

A trailer wheeler or roller bearing 108 depends from the base 14 providing 3 point support for the toy.

The operation of the device will now be described.

The toy is placed on a surface over which it is to operate and the switch actuator 100 moved into engagement with notch 107, closing the electrical circuit to the electric motor 36 and causing the motor shaft 37, and pinion 38 thereon to rotate the gear 63. As viewed in Fig. 4 the motor shaft 37 and pinion 38 will rotate counterclockwise to rotate gear 63 and shaft 60 clockwise. The cooperating shafts 48 and 50 with their respective pinions 52 and 54 will likewise rotate clockwise.

In normal straight-in-line operation the pinions 52 and 54 are in engagement with the outer series of teeth 30*a* and 32*a* of the wheels 30 and 32 as shown in Fig. 4, and the wheels will rotate clockwise to propel the toy forwardly in a straight line. When any portion of any of the feeler members or arms either the rigid feeler arms 68 and 70 or auxiliary members 80 and 82 strikes or contacts an obstruction then the driving means will operate to rotate one of the wheels 30 or 32 in a reverse direction, with the other wheel rotating as before, thereby causing the toy to turn away from the obstruction and continue in another direction, in which direction it will continue until another obstruction is encountered after which the same operation is repeated. For example, if the rigid feeler arm 70 or its auxiliary feeler member 82 or associated antenna strikes an obstruction the arm 70 is moved inwardly as shown in Fig. 5 rocking about pin 67. This causes the bell-crank 42 to rock about the stud 43 so that pinion 54 on the shaft 50 is moved out of engagement with the outer series of teeth 32*a* and into engagement with the inner series 32*b* causing the wheel 32 to rotate in the opposite direction from wheel 30 or counterclockwise. With wheel 30 continuing to rotate in a forward or clockwise direction and wheel 32 rotating in the opposite counterclockwise direction, the toy will be caused to turn to the left as viewed in Fig. 5 to avoid the obstruction and will continue in that direction until it meets with another obstruction at which time a change of direction of movement is again effected.

If the toy is moving forwardly and either the other rigid feeler arm 68 or auxiliary feeler member 80 or its associated antenna is engaged by an obstruction, the rigid feeler arm 68 will be rocked about pin 66, causing the bellcrank 40 to rock about stud 41 rocking pinion 52 from engagement with the outer series of teeth 30*a* and into engagement with the inner series of teeth 30*b* thereby causing the wheel 30 to rotate in a reverse direction. With the wheel 32 rotating forwardly and wheel 30 rotating rearwardly, the toy will be caused to turn to the right as viewed in Fig. 5.

If both feeler arms 68 and 70 simultaneously engage an obstruction as when the toy meets an obstruction head on then both bellcrank levers 40 and 42 will be rocked as aforesaid to effect simultaneous engagement of the pinions 52 and 54 with the inner series of teeth 30*b* and 32*b* causing both wheels 30 and 32 to rotate in a reverse direction and driving the toy rearwardly.

In each instance after either the toy has moved so that a feeler arm or member is out of engagement with an obstruction, the springs 75 and 76 will urge the feeler arms and bellcrank levers back to their initial positions (Fig. 4). It will be observed that there are no blind zones either forwardly or sidewardly of the toy which are not embraced by the feeler arms or members. Thus, at no time is it possible for the toy to strike an obstruc-

tion without at least one feeler arm or member being engaged by the obstruction and a change in direction of the toy effected.

The flanges 68*e* and 70*e* on the feeler arms extend sufficiently downwardly so that they may be contacted even by an obstruction of minimum height and the antenna extend above the toy to engage any obstruction which would be elevated from the floor but would interfere with the passage of the toy thereunder.

The pinions 52 and 54 each have 6 teeth while the outer series of teeth 30*a* and 32*a* each have 72 teeth and the inner series of teeth 30*b* and 32*b* each have 56 teeth. Accordingly, when one of the wheels is caused to operate in a reverse direction it will rotate more rapidly than the other wheel rotating in the forward direction. This results in a rapid turning away of the toy from an obstruction when the same is encountered. The spacing between the inner and outer series of teeth on the wheels is such that the pinions may engage only one series at a time.

It will be seen that the toy of this invention will move constantly as long as the motor is caused to be operated. When the toy strikes an obstruction it will move away from the obstruction and continue its movement in another direction and will continue in an undefined path until the motor circuit is opened or until the dry cells have been exhausted. The dry cells are comparatively inexpensive and may be readily replaced.

While this invention is shown as operated by an electric motor, it will be understood that a spring wound motor may be utilized in lieu thereof with the accomplishment of the foregoing results.

It will be understood that various changes and modifications may be made without departing from the spirit and scope of the appended claims.

We claim:

1. A self-propelled toy, comprising a housing, a pair of wheels supporting said housing, power means for driving said wheels, transmission means effective to drive said wheels simultaneously in either a forward or reverse direction, or to drive each of said wheels simultaneously in opposite directions with respect to each other, said transmission means normally effective to drive said wheels simultaneously so that said toy moves forward in a straight line direction, outwardly extending means extending outwardly of said housing and operatively connected with said transmission means, said outwardly extending means when engaged by an obstruction in the path of travel of said toy being effective to operate said transmission means so that said transmission means simultaneously drives said wheels in opposite directions with respect to each other to change the direction of travel of said toy whereby said toy may turn away from and avoid the obstruction.

2. A self-propelled toy, comprising a pair of wheels, power means for driving said wheels, transmission means effective to drive said wheels simultaneously in either a forward or reverse direction, or to drive each of said wheels simultaneously in opposite directions with respect to each other, said transmission means normally effective to drive said wheels simultaneously so that said toy moves forward in a straight line direction, outwardly extending means extending outwardly of said base and operatively connected with said transmission means, said outwardly extending means when engaged by an obstruction in the path of travel of said toy being effective to operate said transmission means so that said transmission means operates said wheels simultaneously to drive said toy in reverse in a straight line or to drive said wheels simultaneously in opposite directions with respect to each other to change the direction of travel of said toy whereby said toy may turn or rotate away from and avoid the obstruction.

3. A self-propelled toy comprising a housing, a pair of wheels supporting said housing, power means for driving said wheels, a plurality of transmission means supported in said housing one on each side of the medial line of said housing and having one of said transmission means operatively connected to each said wheel and driven by said power means to move said toy forwardly in a straight line, a pair of feelers one on each side of the longitudinal medial line of said housing projecting forwardly and laterally of said housing with the feeler on one side of the longitudinal medial line of said housing operatively connected to said transmission means on the opposite side of the medial line of said housing to operate same so that when the feelers on either side are engaged same will operate said transmission means and the driving wheel on the opposite side thereof to reverse the direction of said rotation of said wheel and to drive said toy in the opposite direction.

4. A self-propelled toy comprising a housing, a pair of wheels supporting said housing, power means for driving said wheels, transmission means supported in said housing and having one of said transmission means operatively connected to each said wheel and driven by said power means to move said toy forwardly in a straight line, a pair of feelers projecting forwardly and laterally of said housing for engagement with an obstruction with the feeler on one side of the longitudinal medial line of said housing operatively connected to the transmission means on the opposite side of the medial line of said housing to operate same so that when the feelers on either side are simultaneously engaged same will operate said transmission means to simultaneously operate the driving wheels to reverse the direction of rotation of said wheels and drive said toy in a reverse straight line and when one of said feelers is engaged it will operate said transmission means and driving wheel on the opposite side of the medial line to rotate in an opposite direction to said other driving wheel to thereby turn or rotate said toy away from and avoid the obstruction.

5. A self-propelled toy comprising a housing, a pair of wheels supporting said housing, power means for driving said wheels, transmission means supported in said housing and having one of said transmission means operatively connected to each said wheel to move said toy forwardly in a straight line, a plurality of pairs of feelers projecting exteriorly and laterally of said housing for engagement with an obstruction, one of each pair of said feelers being rigid and the other flexible, each pair of feelers operatively connected to said transmission means on the side opposite said feelers for controlling the operation of said respective wheels, said pair of feelers when simultaneously engaged will operate the driving wheels simultaneously to reverse the direction of rotation of said wheels and drive the toy in a reverse direction and when either one of said pair of feelers is engaged it will operate the driving wheel on the opposite side in a reverse direction while the other wheel is rotating in the other direction to thereby rotate or turn the toy away from the obstruction.

6. A self-propelled toy comprising a source of power, a pair of driving wheels, a pair of feelers extending outwardly of said toy, means between said power source and said wheels for driving said wheels to move said toy forwardly in a straight line, said feelers being operatively connected to said means so that when both said feelers are engaged by an obstruction said means will be operated to cause said wheels to rotate reversely to move said toy rearwardly in a straight line and when one of said feelers is engaged one of said wheels will be operated to move said toy forwardly and the other wheel to move said toy rearwardly and thereby cause said toy to turn away from said obstruction, and when both said feelers are clear of the obstruction said means will drive said wheels to again move said toy forwardly in a straight line.

7. A self-propelled toy comprising a source of power, a pair of driving wheels, a pair of separate transmission means between said power source and each said wheel for driving said wheels, a pair of feelers extending outwardly

of said toy with each feeler connected to operate one of said separate transmission means so that when said feelers are engaged by an obstruction to cause said separate transmission means to reverse the direction of said driving wheels so that if both feelers are engaged the toy will be driven in a reverse direction and if one of the feelers is engaged the toy will turn or rotate in a direction away from the obstruction and will move forward when the obstruction is cleared.

8. A self-propelled toy, comprising a base, a pair of wheels journalled for rotation in said base, each of said wheels having two concentric series of annular gear teeth arranged coaxially thereof, a pinion mounted for selective engagement with each of said series of gear teeth, power means for driving said pinions, said pinions when operatively engaged with the outer series of teeth being effective to drive said wheels in a forward direction and when engaged with the inner series of teeth being effective to drive said wheels in a reverse direction, spring means movably urging said pinions into engagement with said outer series of teeth whereby said toy is caused to travel is a forward direction, feeler means extending outwardly of said base for engagement with an obstruction and operatively associated with said respective pinions, said feeler means when engaged by an obstruction in the path of travel of said toy effecting engagement of said pinions with the inner series of teeth of said wheels so as to reverse rotation of said wheels and change the direction of travel of said toy.

9. A self-propelled toy, comprising a base, a pair of wheels journalled in said base and supporting the same, each of said wheels having an inner and outer concentric series of annular gear teeth arranged coaxially thereof, power means in operative engagement with a driving shaft arranged intermediate said wheels, the end portions of said shaft having a substantially universal connection with the main portion thereof, a pair of members pivotally supported on said base and each supporting one of said end portions to move therewith, a pinion on each of said end portions arranged for selective engagement with each of said series of teeth, said pinions when cooperating with said outer series of teeth driving said wheels in a forward direction and when cooperating with said inner series of teeth driving said wheels in a reverse direction, spring means normally urging each of said pivotable members in a direction wherein said pinions are caused to engage respective outer series of annular teeth whereby said wheels are rotated in a forward direction, a pair of movable feeler



arms extending outwardly of said base, each feeler arm being connected with a respective pivotable member, either of said feeler arms when engaged by an obstruction in the path of travel of said toy rocking a respective pivotable member whereby the pinion supported thereon is moved into engagement with a respective inner series of teeth of a wheel thereby reversing rotation of said wheel and effecting a change in direction of travel of the toy.

10. A self-propelled toy, comprising a base, a pair of wheels journalled in said base and supporting the same, each of said wheels having an inner and outer concentric series of annular gear teeth arranged coaxially thereof, power means in operative engagement with a driving shaft arranged intermediate said wheels, the end portions of said shaft having a substantially universal connection with the main portion thereof, a pair of members pivotally supported on said base and each supporting one of said end portions to move therewith, a pinion on each of said end portions arranged for selective engagement with each of said series of teeth, said pinions when cooperating with said outer series of teeth driving said wheels in a forward direction in a straight line and when simultaneously cooperating with said inner series of teeth driving said wheels in a reverse direction in a straight line, spring means normally urging each of said pivotable members in a direction wherein said pinions are caused to engage respective outer series of annular teeth whereby said wheels are rotated in a forward direction, a pair of independently movable feeler arms extending outwardly of said base, each feeler arm being connected with a respective pivotable member, both of said feeler arms when engaged by an obstruction in the path of travel of said toy rocking a respective pivotable member whereby the pinion supported thereon is moved into engagement with a respective inner series of teeth of a wheel thereby reversing rotation of said wheel and reversing the direction of travel of said toy in a straight line and when either of said feeler arms is engaged the toy will turn or rotate away from the obstruction.

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