

Oct. 22, 1968

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3,406,481

MOVING TOY DIRECTION-VARIABLE BY A MODULATING RAY

Filed Jan. 20, 1966

2 Sheets-Sheet 1

Fig. 1

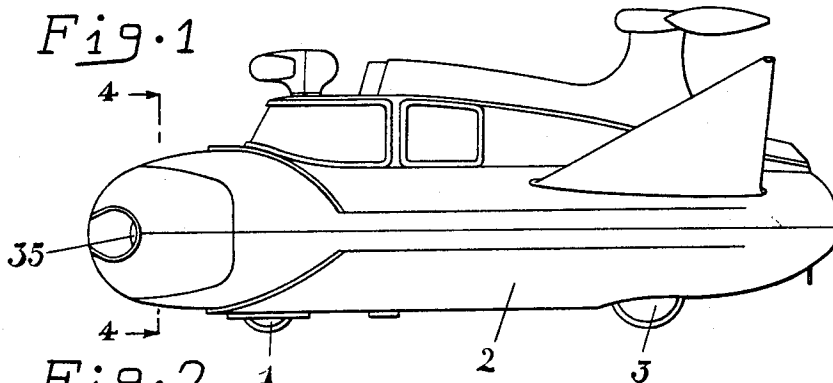


Fig. 2

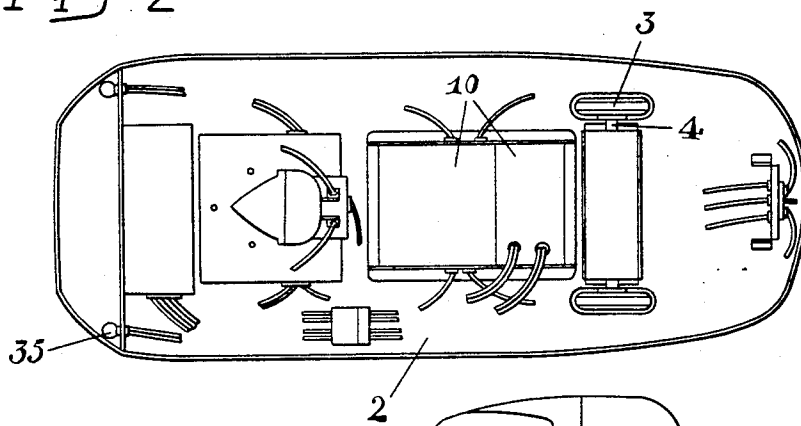
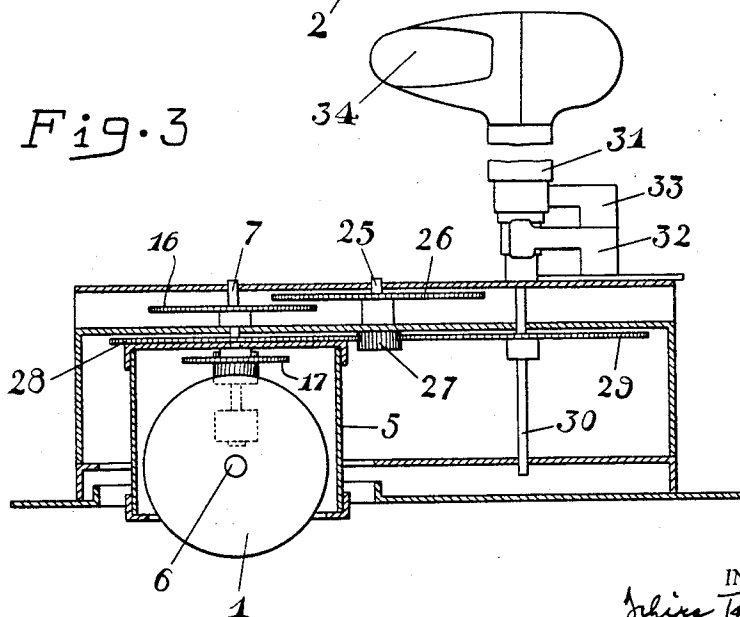


Fig. 3



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Fig. 4

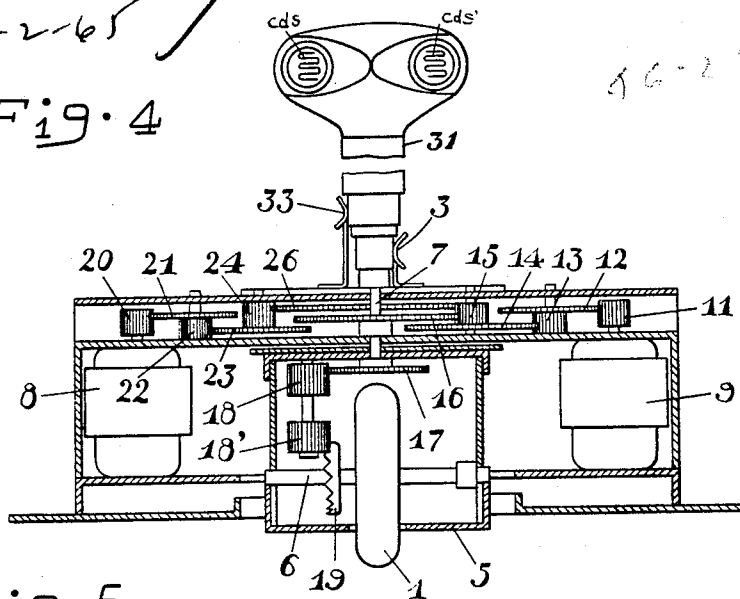
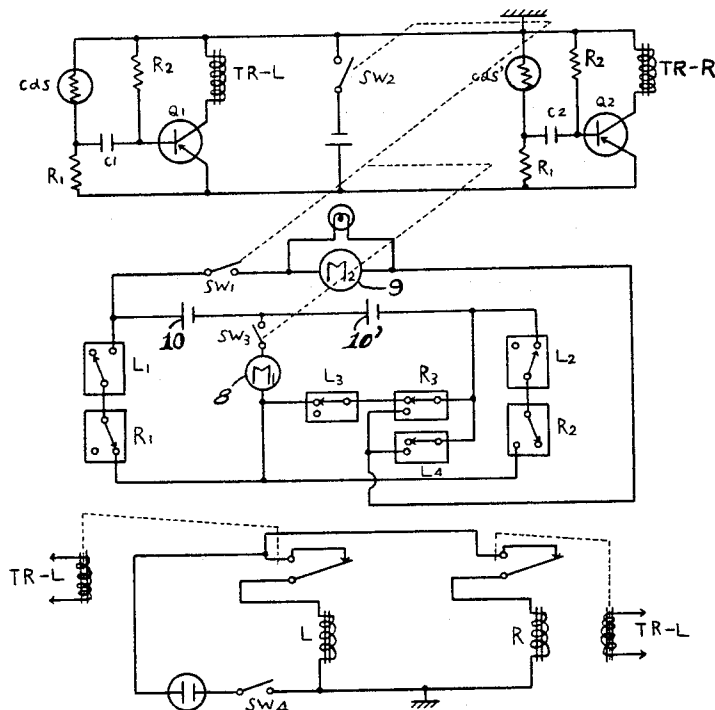


Fig. 5



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3,406,481

MOVING TOY DIRECTION-VARIABLE BY A MODULATING RAY

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Filed Jan. 20, 1966, Ser. No. 521,834

Claims priority, application Japan, Nov. 2, 1965,

40/66,879

5 Claims. (Cl. 46—244)

ABSTRACT OF THE DISCLOSURE

A moving toy, directionally variable to automatically seek and advance toward the instantaneous position of a directed beam of modulating rays, the latter readily distinguished from the ambient, which comprises a body, and a support frame rotatably mounted in the body about a vertical axis. A pair of photoconductive cells are laterally spaced on and secured to the tower and are adapted to operate as light receivers, and circuit means are connected between the pair of photo-conductive cells and the first and second motor means for automatically turning on and off the first and second motor means for causing the toy to turn and advance towards the directed beam of modulating rays.

The present invention relates to a moving toy which is direction-variable by a modulating ray, its photo-electric direction-variable mechanism and a circuit therefor.

Generally in a toy which is direction-variable, the function of the mechanism is used as a direction-indicator to bring about such effects as sound, light and electromagnetic waves.

It is one object of the present invention to provide a moving toy which is direction-variable by a modulating ray, wherein a direction-variable mechanism comprises is achieved, which may be a regular cut ray by, example, photoconducting cells as a receiver, whereby a changing light causes a variation of the electric current with a transistor and condenser and other elements disposed in a circuit.

It is another object of the present invention to provide a moving toy which is direction-variable by a modulating ray, wherein a direction-variable mechanism comprises a modulating ray which impinges upon a rotating light-receiver and the electric current of the photo-electric effect causes the operation of a direction-motor until the toy changes completely its driving direction in response to the incident ray.

With these and other objects in view which will become apparent in the following detailed description, the present invention will be clearly understood in connection with the accompanying drawings, in which:

FIGURE 1 is a side elevation of a moving toy direction-variable by a modulating ray;

FIG. 2 is a top plan view in section showing the internal mechanism, the upper part being removed;

FIG. 3 is a fragmentary enlarged longitudinal section of the toy disclosed in FIG. 1;

FIG. 4 is a cross-section along the lines 4—4 of FIG. 1; and

FIG. 5 is a circuit diagram of a circuit incorporated in the toy.

Referring now to the drawings, the toy comprises a front wheel 1, adapted to advance and change the direction of a toy or car-body 2 including a support frame. A pair of rear wheels 3 is rotatably mounted on a cross axle 4 of the toy or car-body 2. A support frame 5 for the front wheel (FIGS. 3 and 4) supports rotatably a

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front wheel shaft 6 which is adapted for driving the toy or car-body 2 and in turn is driven by a center shaft 7 which operates as a fulcrum to change the direction of the front wheel 1 and to set the direction of the toy or car-body 2. A motor 8 drives, over a reduction gear, the support frame 5. The support frame 5 is rotatably connected with a tower having a pair of photoconductive cells CDS and CDS', made of cadmium sulfide or the like, and also another motor 9 rotates only the front wheel shaft 6, the motors 8 and 9 being fed by batteries 10 and 10', disposed in the circuit shown in FIG. 5.

The motor 9 has a pinion 11 on its shaft, the rotation of the pinion 11 being decelerated by means of small and large gears 12, 13, 14 and 15 and the rotation is transmitted to a large gear 16 fixed on the center shaft 7 and by another gear 17 of the center shaft to small gears 18 and 18', disposed in the support frame 5 to rotate a crown gear 19, which together with said front wheel 1 turns.

The motor 8 has a pinion 20 on its shaft, whose rotation is also decelerated by means of several small and large gears 21, 22, 23 and 24, and the rotation is transmitted to a large gear 26 fixed at a short shaft 25 (FIG. 3) and by a pinion 27 to a large gear 28 disposed in the support frame 5 in order to rotate slowly the support frame 5.

A large gear 29 having the same pitch-circle as that of the large gear 28 and mounted at a vertical shaft 30, is rotated at the same velocity and the same revolution as the support frame 5, the vertical shaft 30 being connected with a tower 31 disposed at the upper part of the toy and including cadmium sulfide photoconductive cells CDS and CDS', which rotate at the same revolution as the support frame 5.

The pair of photoconductive cells CDS and CDS' are operatively connected in the circuit shown in FIG. 5 by brushes 32 and 33, which always maintain engagement.

As disclosed in FIG. 5, there is a fine relay in which the circuit comprises transistors Q1 and Q2 in series condensers C1 and C2, and further with relays or magnetic coils TR-R and TR-L. Connecting switches are likewise disposed in series in the circuit, which are preferably magnetic switches, where relays or magnetic coils R and L, respectively, are operated by the relays TR-R and TR-L and have variable contact points or transfer switches R1, R2, R3 and L1, L2, L3, L4.

The disclosed circuit operates in the following manner: By first switching the magnetic switches SW1, SW2, SW3 and SW4 connected in series, a circuit 8, SW3, 10', L3 causes the motor 8 to start rotating turning the support frame 5 and the tower 31 at the same speed (so as to always be aligned) by means of the gears 20, 21, 22, 23, 24, 26, 27, 28 and 29.

Modulating rays from a source (not shown) for example, then illuminate one of the photoconductive cells CDS and CDS', which are turning about with the tower 31, and thereby transform modulating rays into electric current, which is properly amplified by the transistor Q1 and the condenser C1, and rendering operative the relay or magnetic coil TR-L (FIG. 5).

As further indicated in the circuit, the magnetic force of the relay TR-L operates the relays L, and magnetic force modulation causes in the circuit SW4, L, battery the electric current to decrease, to change a magnetic switch as the connecting transfer switches L1, L2, L3, L4 of the original contact state to another contact state.

Then, a new circuit SW1, 9, L4, 10', 10 causes the motor 9 to operate, rotating the front wheel shaft 6 to cause the toy to advance, but the motor 8 is still operated by another new circuit 8, SW3, 10, L1, R1 and the tower 31 and the support frame 5 still rotate to change the toy's direction toward direction of the source of the

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modulating rays, until the rays are directed to both of the photo-cells CDS and CDS'.

When this direction is reached, in accordance with the same principle as the L-system, the R-system (the relays or magnetic coil TR-R, R, variable contact points or transfer switches R1, R2, R3) operates to open the switch R1 and no circuit containing the motor 8 is operative, and therefore, only the motor 9 is operative to increase the toy's straight movement directly toward the source of the modulating rays.

In this manner the toy changes its moving direction toward the incident ray and advances straight into the light.

Again changing the modulating ray source so that the rays emanate from another direction toward the tower of the toy, the toy again changes its direction toward the new ray source, first stopping its advance and turning and then moving straight into the light by the same operation as above mentioned.

Covers 34 are provided for the photo-cells CDS and CDS' (FIG. 3), and headlights 35 are shown in FIG. 2.

As according to the present invention, a moving toy direction-variable by a modulating ray, as mentioned above, is able to change its moving direction only by a modulating ray and there is no danger of usual ambient light variation, such as in or out-doors, which may cause the change of its moving direction, most children can play with these toys pleasantly and interestingly.

While I have disclosed one embodiment of the present invention, it is to be understood that this embodiment is given by example only and not in a limiting sense, the scope of the present invention being determined by the objects and the claims.

I claim:

1. A moving toy, directionally variable to automatically seek and advance toward the instantaneous position of a directed beam of modulating rays, the latter readily distinguished from the ambient, comprising:

- a body,
- a support frame rotatably mounted in said body about a vertical axis,
- an axle horizontally mounted in said support frame,
- a front wheel axially mounted on said axle,
- a first motor means operatively connected with said support frame for controlling the direction of said toy,

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a second motor means operatively connected with said front wheel for turning the latter,

a tower rotatably mounted on said body about a vertical axis and aligned with and operatively connected to said support frame for joint parallel rotation therewith,

a pair of photo-conductive cells laterally spaced on and secured to said tower and adapted to operate as light receivers, and

circuit means connected between said pair of photo-conductive cells and said first and second motor means for automatically turning on and off said first and second motor means for causing said toy to turn and advance towards said instantaneous position of said directed beam of modulating rays.

2. The moving toy, as set forth in claim 1, wherein: said circuit means comprises,

first circuit means for placing said first motor means in an operative condition to rotate said support frame and said tower jointly when said modulating rays do not impinge equally on both said photo-conductive cells, and

second circuit means for operating said second motor means when said rays impinge on at least one of said pairs of photo-conductive cells.

3. The moving toy, as set forth in claim 2, wherein: said first motor means rotates said support frame in one direction.

4. The moving toy, as set forth in claim 2, wherein: said pair of photo-conductive cells are angularly mounted relative each other and together pointing in a direction parallel to said front wheel.

5. The moving toy, as set forth in claim 2, wherein: said first and second circuit means include transistors, relays, connecting magnetic switches, connecting transfer switches and batteries.

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