

Feb. 19, 1952

R. A. MacKENZIE

2,586,239

REMOTE-CONTROLLED TOY BULLDOZER

Filed Sept. 2, 1947

2 SHEETS—SHEET 1

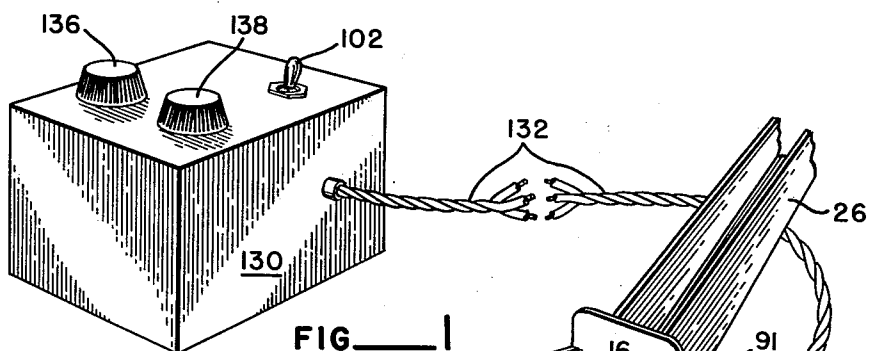


FIG. 1

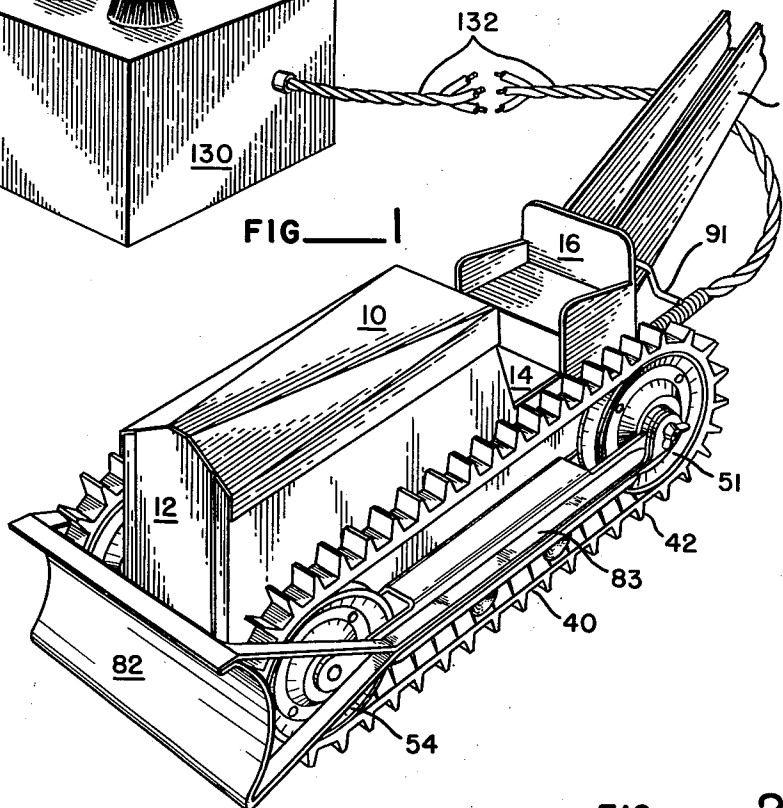


FIG. 2

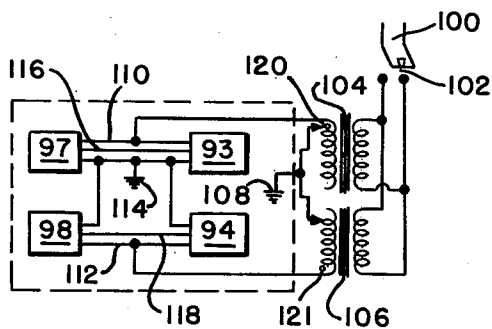
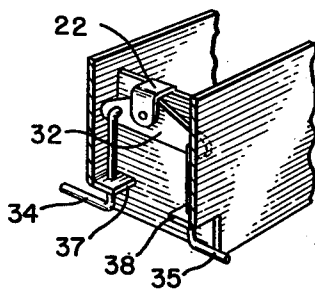


FIG. 3



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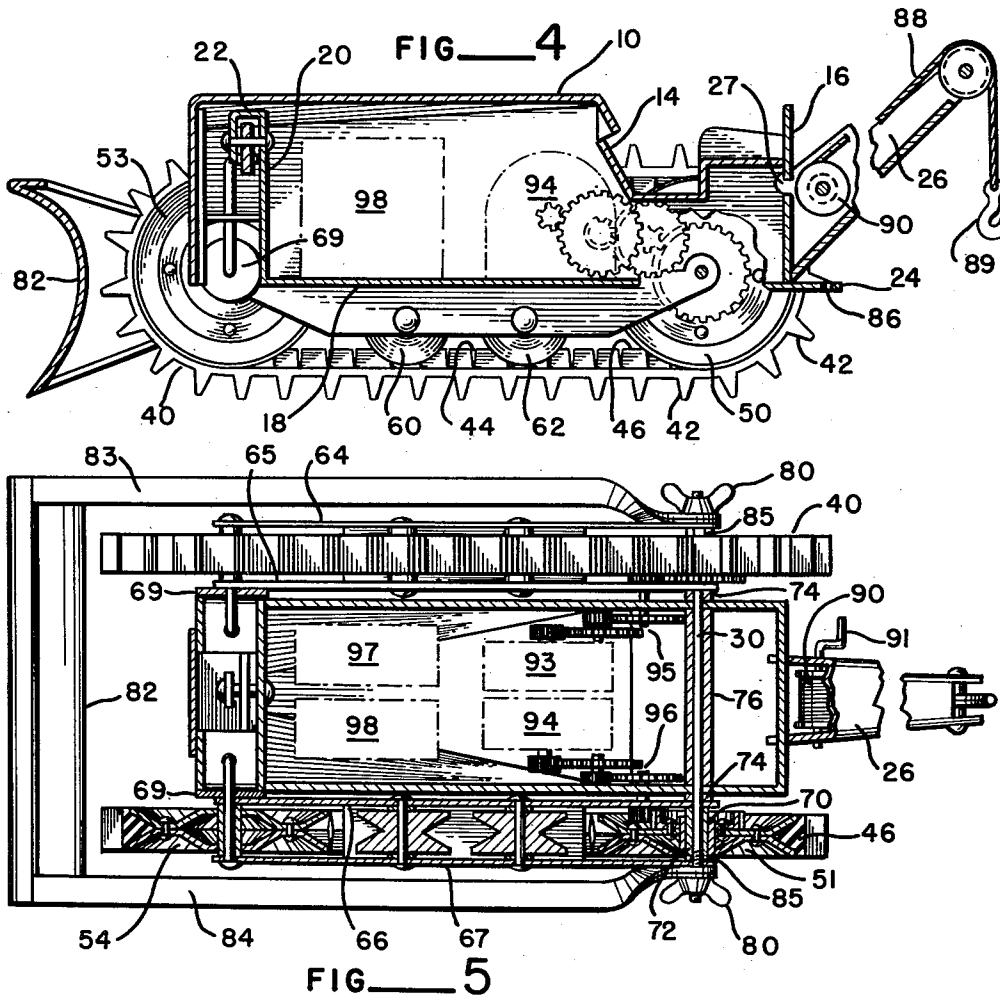
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2 SHEETS—SHEET 2



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UNITED STATES PATENT OFFICE

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REMOTE-CONTROLLED TOY BULLDOZER

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5 Claims. (Cl. 46-219)

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My present invention relates to the general art of mechanical or electrical toys and more particularly to a remote controlled toy bulldozer.

Mechanical toys for children usually reflect the current development in the industrial fields. Consequently, with the increased use of bulldozers for all forms of dirt handling work, for logging, and many types of hauling, it is only logical that there is an increasing demand among mechanically-minded children for a bulldozer which will, to a large degree, simulate the functioning of a full-scale machine.

There have been many toy bulldozers offered to the trade, many of them possessing very unique and life-like reproductions of the original; however, any bulldozer that must be hand-directed loses its appeal to the child experienced with mechanical toys and, for this reason, there have been some attempts to produce bulldozers capable of remote control, by electrical and other means.

My invention is a bulldozer of this latter type in which the directing and energizing of the drive means of the bulldozer is effected by controlled electric circuits.

I am further aware of the fact that there have been previous attempts to produce remote controlled bulldozers and other electrically operated toys. However, those that have been observed have been of a character which required a bundle of operating current-carrying conductors which were of necessity fragile, due to their number, and generally bulky, unwieldy, and in many instances served to handicap the bulldozer in its normal functioning. In my present invention, I have provided a bulldozer which is capable of many of the operations of a full-scale bulldozer, and I have provided control means of the remote electrical type, in which it is only necessary to have three comparatively small wires running to the bulldozer from the control box.

The principal object of my present invention, therefore, is to produce a bulldozer, in toy form, which can be made to function from a remote point in the manner common to full-scale bulldozers.

A further object of my invention is to provide a bulldozer, of the toy type, in which a full range of controls is provided, yet the conductors required to produce this effect can be kept to a minimum, and because of this fact, they can be kept in a very small cable.

A further object of my invention is to provide a bulldozer so arranged that the treads can fol-

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low the uneven contour of the ground so as to carry out faithfully the action of a full-scale machine.

A further object of my invention is to provide a toy tractor in which remote control can be combined with simplicity of construction, to the end that an attractive, entertaining toy can be produced at a minimum cost.

Further objects, advantages and capabilities will be apparent from the description and disclosure in the drawings, or may be comprehended or are inherent in the device.

In the drawings:

Fig. 1 is a perspective view showing a bulldozer made after the teachings of my present invention; including a remote control box connected by a cable shown in fragmentary form.

Fig. 2 is a fragmentary view partly in section and in perspective showing the support means for the front track supporting wheels.

Fig. 3 is a schematic circuit diagram of the electrical control means used in my device, that portion of the circuit shown in the broken line box designating the parts that are contained within the tractor unit itself.

Fig. 4 is a vertical, longitudinal sectional view through my tractor, certain parts being broken away to better illustrate the construction.

Fig. 5 is a bottom plan view of my tractor with certain parts shown in section and with the relative position of the drive motors and reversing gears shown in broken lines.

Referring more particularly to the disclosure in the drawings, the main and supporting frame of my tractor is provided by the general housing, preferably formed of sheet metal of fairly heavy gauge, and having the top portion 10, the front or radiator portion 12, the cockpit portion 14, and the seat and back assembly 16. To this box-like housing or framework is removably secured a floor member 18, an axle supporting wall 20 and the overhanging bracket member 22. As I currently conceive my toy, plate 18 is used to support the motors and reversing switches used therewith. At its rear end, housing 10 has the draw bar at 24 and a boom member 26. Boom 26 is removably secured by means of a plurality of hooks 27 which engage openings in back member 16.

Passing entirely through the rear portion of the frame-work is the rear axle 30. At the front end, I provide the front axle made after the showing of Figs. 2, 4, and 5. It is to be noticed in Fig. 2 that a balanced lever is provided at 32

which is pivotably secured to the overhanging bracket 22. Pivotably secured at each end of lever 32 are the front axle members 34 and 35. These are each formed with a vertical portion extending down through guide brackets 37 and 38 respectively. Each of the axle members then has a right angle bend so that when lever 32 is in a horizontal position, the two end portions of axles 34 and 35 will be axially aligned.

The tractor or track-laying treads of my bulldozer as designated generally by the reference character 40, are formed of rubber or rubber-like composition material. For most uses, I have found it best to form this track with grousers 42 equally spaced and placed substantially as shown throughout my drawings. This seems to give my tractor a high degree of traction and still permits it to climb over the usual suitable objects that give the toy tractor so much appeal to the youngsters.

The inner portion of my tractor treads is preferably formed with a V cross section composed of a number of abutting segments 46 having cut-out V's, as 44, between them, of such extent that there will be no binding of this inwardly extending V as the treads pass around the grooved supporting wheels.

The tracks 49 are mounted for movement upon the driving grooved wheels 50 and 51 and the idler wheels 53 and 54. The driving wheels are revolvably mounted upon axle 30 and are always in alignment with each other due to the necessity for having fixed centers because of the gear reduction and drive means. The forward wheels 53 and 54 are mounted respectively on axles 34 and 35 so that they are free to move vertically with respect to each other. This, of course, permits the front ends of the treads to move vertically with respect to the tractor body itself. Actually, they move in their entirety, pivoting about the rear axle 30, and the effect is very realistic. One worth-while effect of this balancing of the two front sheaves, however, is to permit the tractor to negotiate steps with one tread, as for instance, in going over a book without tipping over. This, of course, is done by a full-scale bulldozer. As this unique front axle arrangement gives this same effect, it is both instructive and entertaining, particularly to juveniles.

To further carry out the appearance and functioning of the full-size bulldozer, it is desirable to have bogie wheels intermediate the drive wheels and the idlers. Throughout my drawings I have illustrated two of these bogies at 60 and 62. These small wheels are grooved so as to accept the V blocks 46, and they are in turn pivotably supported on rivets passing through two companion tread support members as 64 and 65, 66 and 67. Spacing collars 69 act as spacers between the support members and the enclosing housing. These members are pierced by the front axles and quite faithfully carry out the appearance of the bulldozer, in addition to their function. It will be noticed that the driving sheaves or wheels 50 and 51 are provided with enlarged axle tubes 70 which revolve upon spacer members 72. These spacer members, together with washers 74 and the rear axle-encircling tube or strut 76, make it practical to use wing nuts 80 so that frictional positioning can be assured to the bulldozer blade 82 and its associated side rails or supporting members 83 and 84. Lock nuts 85 hold the rear axle assem-

bly in place if it is desirable to remove the blade 82 and its supporting members 83 and 84.

In order to adapt my toy to other purposes than bulldozing with blade 82, I provide the draw bar 24, fixed to frame member 16 and having the hole 86 to which any towed load may be attached. To further increase the interest in the toy, I have provided the boom 26 secured to the rear end of the bulldozer. This is arranged to accept a cord 88 and preferably a hook as 89, and the drum 90 on which the cord, simulating a cable, can be wound by means of crank 91.

To drive my bulldozer in a true-to-life manner, I provide a separate driving electric motor, as 93 and 94, for the drive sheaves or wheels 50 and 51 respectively. These motors are coupled to the drive wheels by means of the compound reduction gearing shown at 95 and 96. In order to provide the most spectacular controls for my motors 93 and 94 so that they, in turn, can impart the most life-like action to the tractor treads, I provide reversing switches at 97 and 98, respectively. These switches are of a type which is well known in certain lines of endeavor. By solenoid action, a stoppage of the current and then the making of the circuit again gives a reversing action to the treads; thus, if a motor is going in one direction, and the current is interrupted and then restored to continuity, the new start will be in the reverse direction. This provides unusual control over a toy of this order, and by reference to Fig. 3, it will be noted that this mechanism provides for the minimum of control wires to the tractor.

In referring to Fig. 3, we have the input to the system which preferably is from a source of 110 A. C. current designated in the drawing by the reference character 100. A switch is provided, 102, which preferably is the quick-acting type so that quick starts and stops can be achieved. The current is fed through switch 102 to a pair of variable transformers 104 and 106. From the secondaries of these transformers, one lead goes to a ground upon the tractor, as indicated at 108. The other end of the secondary coils goes to the motor and the reversing switch of a pair. In the drawings, this lead is shown at 110 and 112. All four of the units, the two motors and the two reversing switches are grounded to the tractor frame at 114, and in order to complete the reversing cycle, the coacting pairs of motors and reversing switches are connected straight through by leads 116 and 118.

If it is remembered that the switch and transformers are in a compact and portable unit, and that only three leads are thus taken from the remote unit to the tractor, it will be seen how it is possible to get the unusual functioning of this tractor with only three wires. This makes it possible to have the control cable of fair-sized wire to insure long life, yet its over-all size will be small. It can be of a very flexible type of stranded wire obtainable commercially that is almost indestructible through ordinary wear and tear.

In Figure 1 is shown remote control box 130 connected to the tractor body by cable 132 formed of three wires. Control of power to the transformers is provided by switch 102. Control of the variable transformers is furnished by knobs 136 and 138. The circuit arrangement just described makes it possible to directly drive either belt at full speed and to have the opposite belt at any reduced speed desired or stopped, if dead points 120 or 121 are used. When the function

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has been understood, through trial, it is possible therefore to make the tractor turn through a large radius or turn very sharply, thus spinning on the very slow moving tread while the other tread has full power applied. This ability to so thoroughly and completely control the direction of travel of the tractor, combined with the reversing feature, makes it possible to give the toy most unusual and spectacular performance.

It is believed that it will be clearly apparent from the above description and the disclosure in the drawings that the invention comprehends a novel construction of a remote controlled bulldozer.

Having thus disclosed the invention, I claim:

1. A toy tractor, comprising: a main frame forming a sheet metal housing having a top portion, a front portion, a cockpit portion, a seat and back assembly, a floor member and connecting side members; said floor member having a front axle supporting wall and an overhanging bracket member; a balanced transverse lever pivotally secured to said bracket member; a pair of front idler sheaves; a pair of L-shaped front axle members, each connected at one end to one end of said lever and having one of said idler sheaves mounted on the other end; a rear axle journaled in said housing having adjusting nuts on each end and having a plurality of encircling tubes and washers to accept compressive pressure from said adjusting nuts; a pair of rear drive sheaves rotatably mounted at the sides of said housing and encircling said rear axle and encircling tubes; a pair of resilient belt treads disposed on said drive and idler sheaves at either side of said housing; tread supporting members extending on each side of said treads and connected to said front and rear axles; a bulldozer blade disposed in front of said housing and blade supporting members extending outside of said tread supporting members and joining said rear axle inside of said adjusting nuts to be frictionally positioned by coercion of said adjusting nuts, said tread supporting members and said plurality of encircling tubes and washers; individual speed reducing gearing for each of said drive sheaves; and electrical drive means for said drive sheaves connected to said gearing.

2. A toy tractor, comprising: a sheet metal housing forming a main frame; said housing having a front axle supporting bracket member; a balanced transverse lever pivotally secured to said bracket member; a pair of front idler sheaves; a pair of L-shaped front axle members, each connected at one end to one end of said lever and having one of said idler sheaves mounted on the other end; a rear axle journaled in said housing having adjusting nuts on each end and having a plurality of encircling members to accept compressive pressure from said adjusting nuts; a pair of rear drive sheaves rotatably mounted at the sides of said housing and encircling said rear axle and encircling members; a pair of resilient

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belt threads disposed on said drive and idler sheaves at either side of said housing; thread supporting members extending on each side of said treads and connected to said front and rear axles; and a bulldozer blade disposed in front of said housing and blade supporting members extending outside of said tread supporting members and joining said rear axle inside of said adjusting nuts to be frictionally positioned by coercion of said adjusting nuts, said tread supporting members and said plurality of encircling members.

3. A toy tractor, comprising: a main frame forming a sheet metal housing; a front axle supporting bracket members secured to said housing; a balanced transverse lever pivotally secured to said bracket member; a pair of front idler sheaves; a pair of front axle members, each connected at one end to one end of said lever and having one of said idler sheaves mounted on the other end; a rear axle journaled in said housing; a pair of rear drive sheaves rotatably mounted at the sides of said housing on said rear axle; a pair of resilient belt treads disposed on said drive and idler sheaves at either side of said housing; tread supporting members at the sides of said housing and connected to said front and rear axles; and drive means for said drive sheaves.

4. A toy tractor, comprising: a main frame forming a housing; a front axle supporting bracket member secured to said housing; a balanced transverse lever pivotally secured to said bracket member; a pair of front idler sheaves, each connected to one end of said lever; a rear axle journaled in said housing; a pair of rear drive sheaves rotatably mounted at the sides of said housing on said rear axle; a pair of resilient belt treads disposed on said drive and idler sheaves at either side of said housing; tread supporting members at the sides of said housing and connected to said front and rear axles; tread supporting bogie sheaves revolvably mounted on said tread supporting members.

5. A toy tractor, comprising: a main frame forming a housing; a front axle supporting bracket member secured to said housing; a balanced transverse lever pivotally secured to said bracket member; a pair of front idler sheaves, each connected to one end of said lever; a rear axle journaled in said housing; a pair of rear drive sheaves rotatably mounted at the sides of said housing on said rear axle; a pair of resilient belt treads disposed on said drive and idler sheaves at either side of said housing.

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The following references are of record in the file of this patent:

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