

Aug. 2, 1938.

G. E. SMALLWOOD

2,125,590

TOY VEHICLE

Filed Sept. 15, 1937

2 Sheets-Sheet 1

Fig.1.

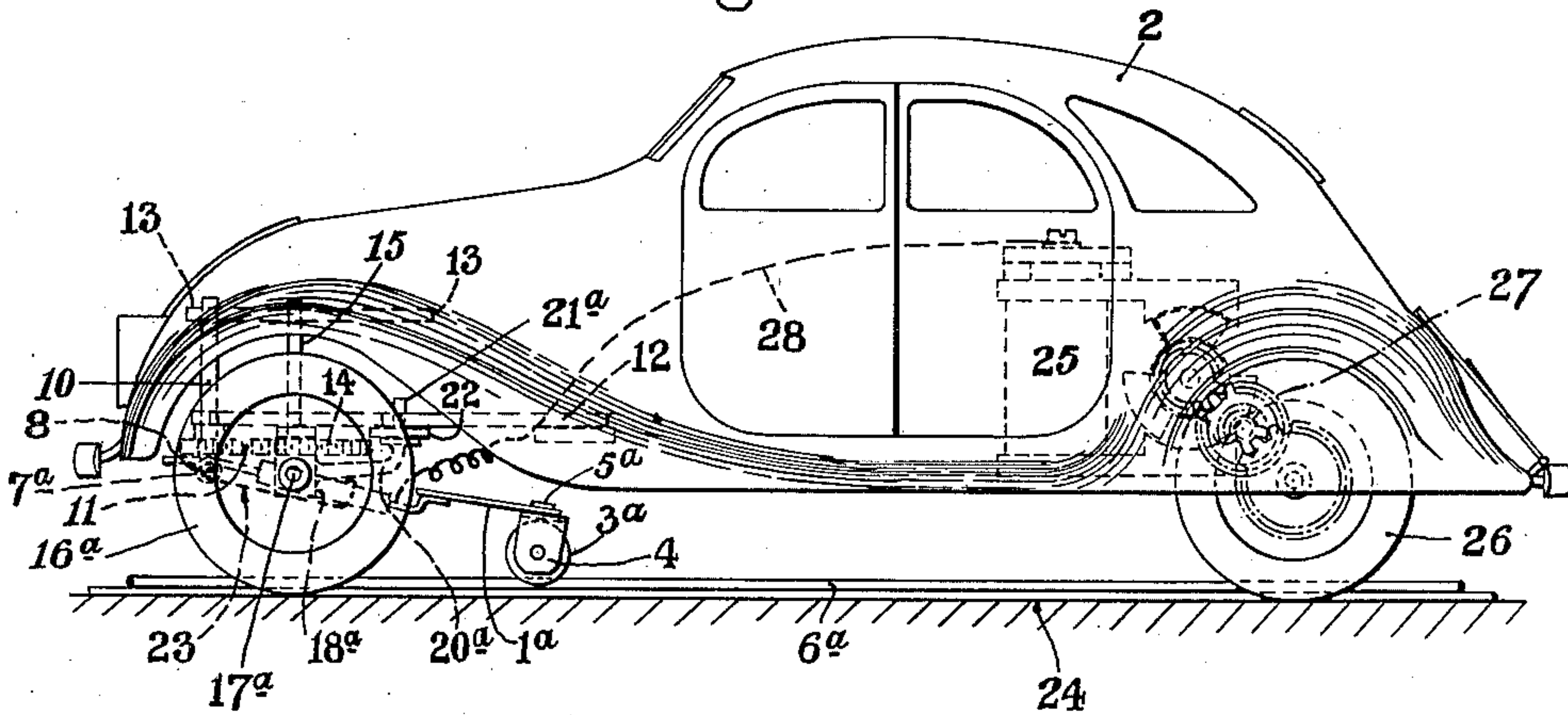
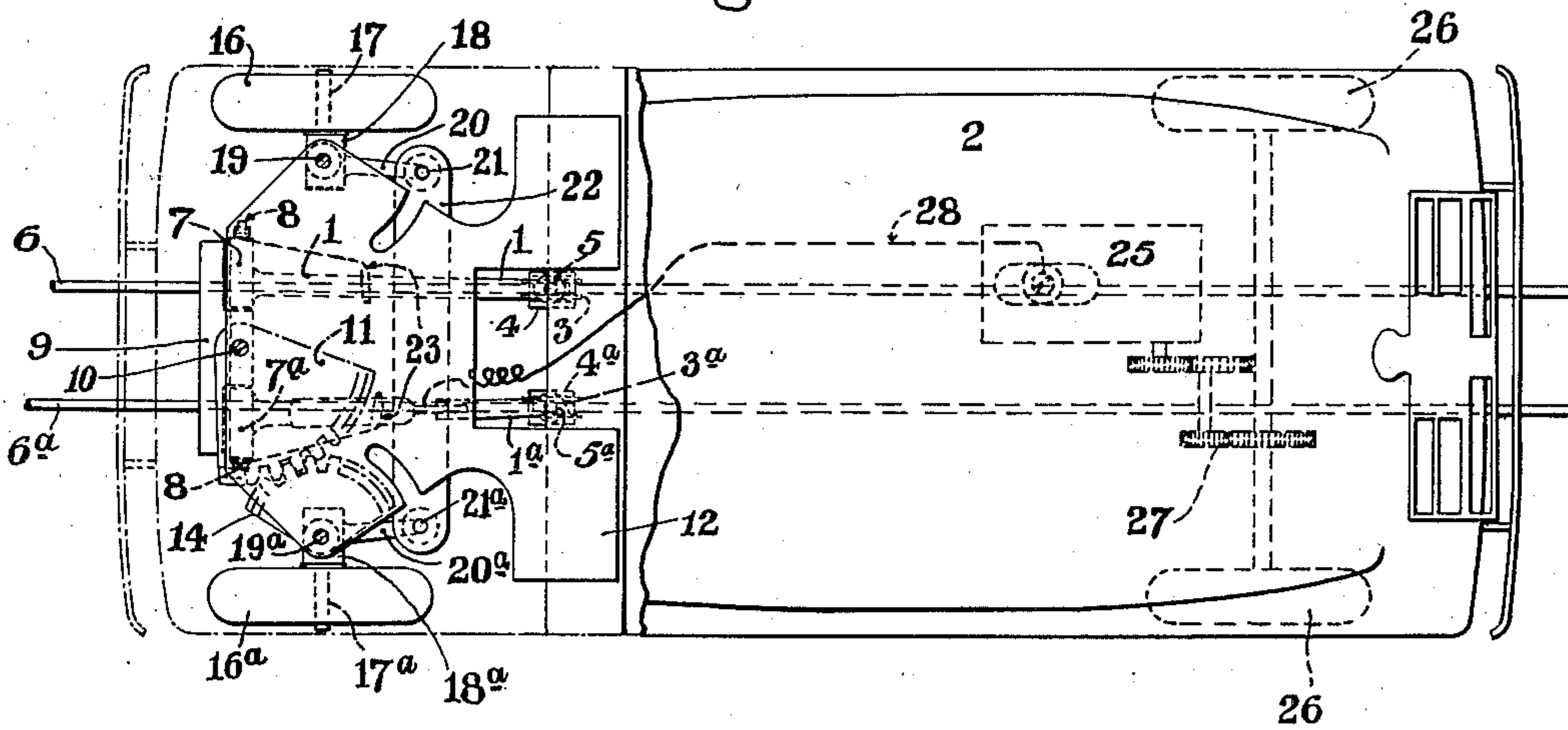


Fig.2.



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Fig. 3.

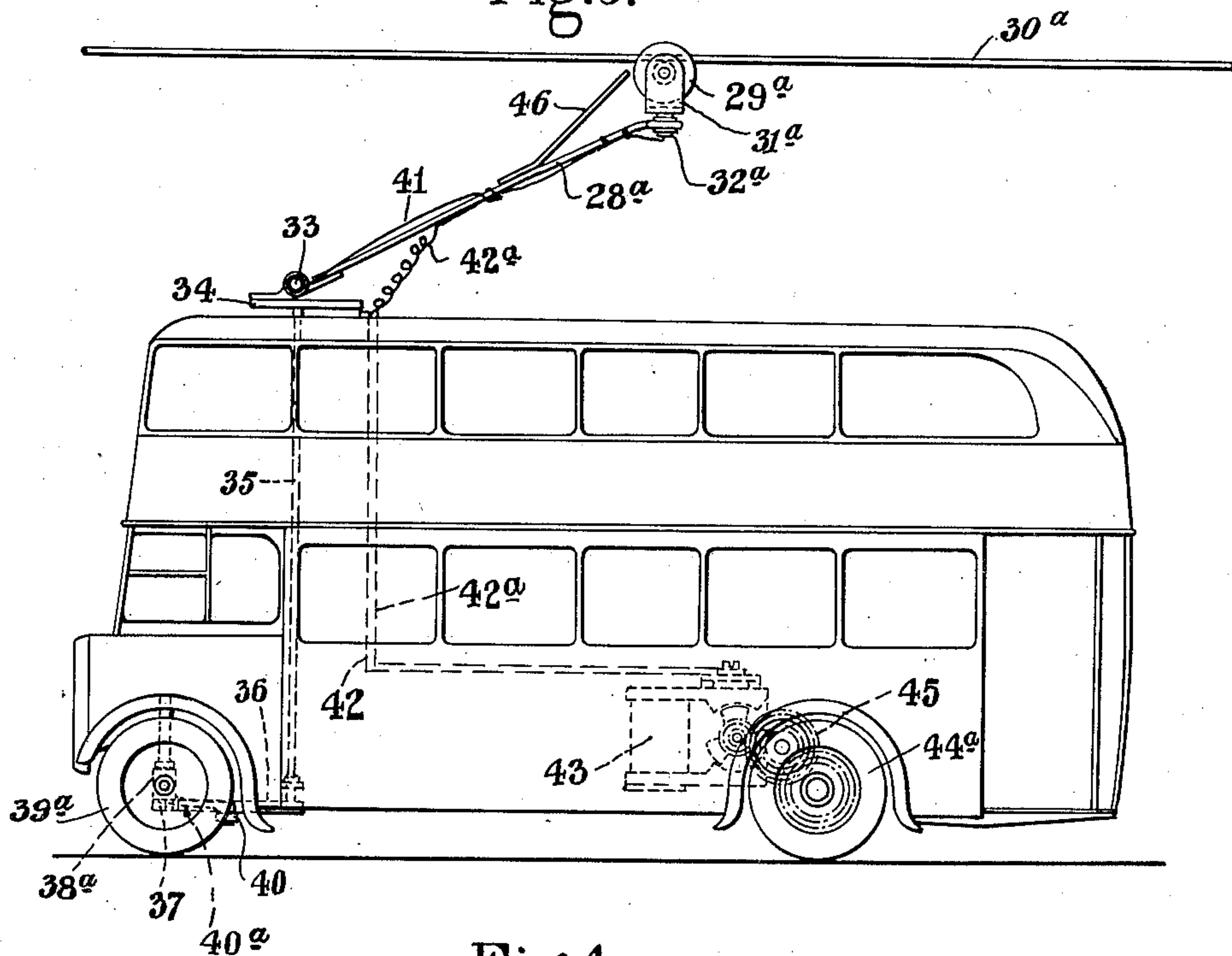
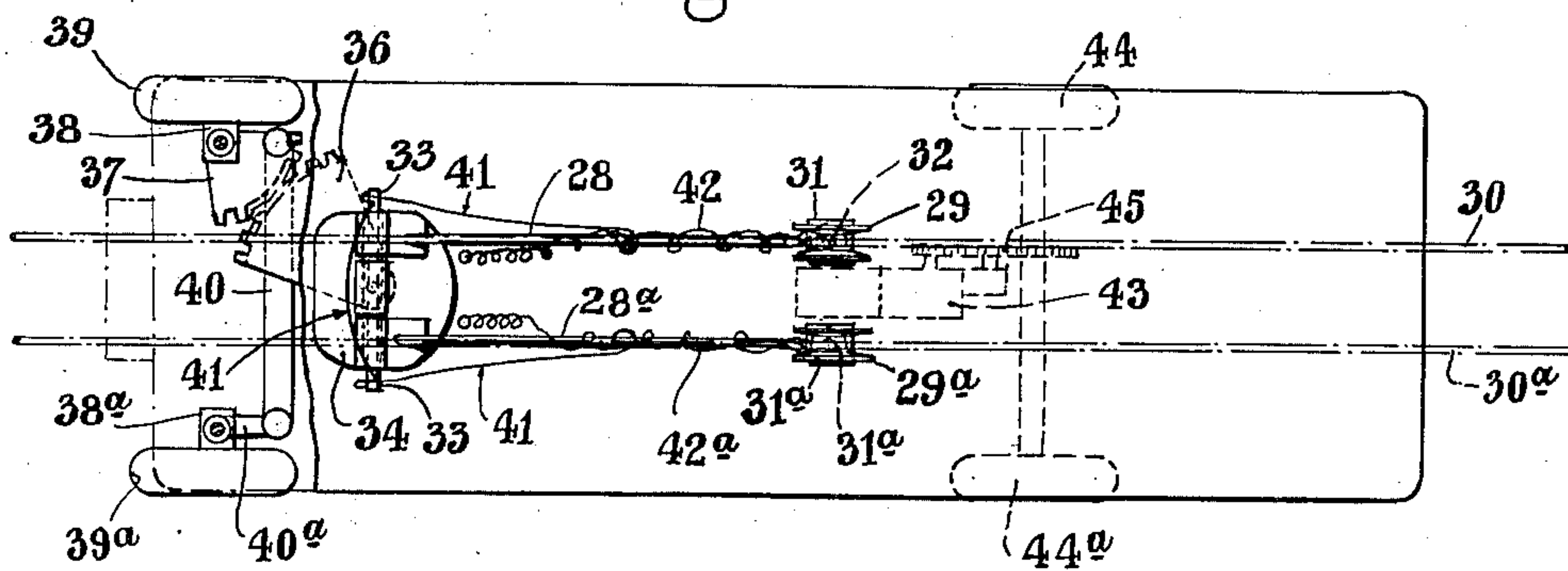


Fig. 4.



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UNITED STATES PATENT OFFICE

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TOY VEHICLE

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4 Claims. (Cl. 104—247)

This invention consists in improvements in toy vehicles.

The object of the invention is to provide means for automatically steering an electrically or mechanically driven toy road vehicle, such as a toy motor-car or trolley bus, in accordance with the configuration of a track formed of a wire, rail or the like which can be set up or laid out in accordance with any desired "route" comprising straights, curves, inclines etc., along which the toy vehicle is to travel.

With this object in view my invention consists in a toy vehicle having means for propelling same and steering mechanism adapted to impart directional movement to the steering wheels of the vehicle, the said steering mechanism being automatically actuated by means of a swingable arm connected to said steering mechanism and pivoted to the vehicle adjacent the front end of the same and normally extending rearwardly from its pivot along the central vertical plane of the vehicle, the free end of said arm carrying a grooved wheel or shoe pivotal about an axis substantially vertical to said arm and adapted to run either upon the top of, or in contact with, the under side of a wire or rail conforming with the route along which the vehicle is to travel whereby on said wheel or shoe meeting a curve on the route wire or rail, the arm will be swung to the one or other side of said vertical plane of the vehicle and will actuate the steering mechanism thereof accordingly.

In the case of electrically driven toy vehicles double route wires or rails convey the current from a suitable source of supply to the driving motor of the vehicle through suitable connections, and two grooved castor wheels each mounted on a separate arm pivoted with a certain amount of play on a common horizontal cross shaft mounted on a vertical shaft or pivot, these arms being individually vertically turnable about the cross shaft and collectively swingable about the vertical shaft or pivot. In this case two symmetrically arranged wires or the like would be provided, one of said wires or rails conveying the current and the other for the return, suitable insulations being provided where necessary.

The annexed drawings illustrate two examples of construction of the invention respectively applied to a toy motor car and to a toy trolley-bus which are electrically driven, double swingable arms and route wires or rails being provided.

Fig. 1 is a side elevation of the toy motor car,

Fig. 2 is a plan view of Fig. 1 with part of the car body broken away and showing the two swing-

able arms and the steering mechanism in dotted lines, as seen from above.

Fig. 3 is a side elevation of the toy trolley bus.

Fig. 4 is a plan view of Fig. 3 with part of the body of the bus broken away and showing the swingable arms and the steering mechanism.

In the construction shown in Figs. 1 and 2 the double swingable arms 1, 1a are arranged below the body of the car 2 and each is provided at its free end with a small grooved wheel 3, 3a revolvable in bearing forks 4, 4a which are angularly turnable about substantially vertical pivots 5, 5a, the wheels 3, 3a are thus castor wheels and run on parallelly arranged current conveying wires.

The inner ends of the arms 1, 1a are provided with transverse bearing sleeves 7, 7a by which they are mounted with a certain amount of play on a transverse shaft 8 fixed to a horizontal plate 9 which is attached to a vertical rotatable shaft 10. The arms 1, 1a are thus capable of vertical angular movement about the shaft 8 and owing to the loose mounting thereon, the free ends of the arms, and consequently the pivots 5, 5a can have a certain amount of lateral movement, this allows for any variation in the spacing between the route wires. To the shaft 10 is also fixed a horizontal toothed quadrant 11. The shaft 10 has its bearings in a plate 12 and in an upper plate 13.

The quadrant 11 gears with a second quadrant 14 fixed on a rotatable vertical shaft 15 having its bearings in the plates 12 and 13. The steering wheels 16, 16a are rotatably mounted on pins 17, 17a extending laterally from blocks 18, 18a these blocks being fixed to rotatable vertical pins 19, 19a having bearings in the plate 12. The free ends of arms 20, 20a are pivoted as at 21, 21a to the respective ends of a connecting link 22, the inner ends of said arms being fixed to the blocks 18, 18a.

The arms 1, 1a being turnable about the shaft 8, a light wire spring 23 is provided on each and operating to maintain them depressed so that the grooved wheels 3, 3a are maintained in contact with the route wires 6, 6a.

By this mechanism the angular movement of the quadrant 11 is transferred through the quadrant 14 to the wheel 16a through its block 18a which, in turning the arm 20a, actuates the arm 20 of the wheel 16 through the link 22 so that the two wheels 16, 16a will always turn through equal angles while remaining parallel to one another.

In the drawings, the route wires 6, 6a are shown to be straight but when a curve occurs in

the layout of these wires the grooved castor wheels 3, 3a will move to the right or the left and the arms 1, 1a will swing accordingly and cause the steering wheels to turn, by the mechanism described, in accordance with the new direction of the route wires 6, 6a and the vehicle will travel accordingly, the road wheels 16, 16a thereof running on a basic support 24 on which said wires would be laid.

The vehicle is driven by an electric motor 25 contained within the body 2 and driving the rear wheels 26 through suitable gears 27; the current would be conveyed from a suitable source of supply by the route wire 6a and picked up by the wheel 3a and the arm 1a to the lead 28 and thence to the motor 25 the return lead being through the arm 1 wheel 3 and the route wire 6.

In the trolley bus shown in Figs. 3 and 4 the swingable arms 28, 28a are provided with grooved castor wheels 29, 29a adapted to run against twin overhead current conveying route wires 30, 30a suitable supports being provided for these wires.

The grooved wheels 29, 29a are mounted in forks 31, 31a turnable about substantially vertical pivots 32, 32a carried by the extremities of the arms 28, 28a in a similar manner to the grooved wheels 3, 3a in Figs. 1 and 2 but inverted. Also the arms 28, 28a are similarly mounted with a certain amount of play on a transverse axle 33 so as to be capable of vertical rotatory movement about said axle while being allowed a certain amount of individual lateral movement at their extremities, consequently the pivots 32, 32a and the grooved wheels 29, 29a can have like movements.

These individual lateral movements which the wheels 29, 29a can assume, allow for proper contact of said wheels with the route wires 29, 29a in spite of any variations which may be present in the spacing between said route wires.

The transverse axle 33 is carried on a plate 34 fixed to the top of a vertical shaft 35 extending through the body of the bus and supported by suitable bearings. Fixed to the bottom end of the shaft 35 is a toothed quadrant 36 gearing with a second toothed quadrant 37 fixed to the block 33 of the steering wheel 39. The angular movement of the quadrant 36, caused by a movement of rotation of the shaft 35 promoted by a swinging movement of the arms 28, 28a, is imparted to the quadrant 37 and the steering wheel 39 to the steering wheel 39a through the link 40, arm 40a and block 38a. The mounting of the steering wheels and the connecting link 40 is similar to that described with reference to Figs. 1 and 2 so that the action will be readily understood without further description.

The arms 28, 28a are supported in such a way that the wheels 29, 29a will be maintained in good running contact with the route wires 30, 30a by means of a wire spring or springs 41, and the current is conveyed by the wheel 29, 29a through the lead 42 to the driving motor 43 of the vehicle and returned through the lead 42a to the wheel 29a, or vice versa, the motor being connected to the driving wheels 44 by gearing 45 as in the construction illustrated in Figs. 1 and 2.

Each arm 28, 28a is provided with a guide wire or the like 46 the purpose of which is, in case of sagging of the wires 30, 30a or other causes, to prevent the said wires from fouling the castor wheels 29, 29a.

What I claim as my invention and desire to secure by Letters Patent of the United States, is:

1. In a toy vehicle comprising front steering

wheels, driving wheels and means for driving the latter and thereby the vehicle, the combination of a vertical angularly turnable spindle mounted towards the front end of the body of the vehicle in the central vertical plane of said body, means connecting said spindle to the steering wheels of the vehicle whereby angular movements imparted to said spindle impart directional movements to each of the steering wheels, a track, a steering arm extending from said spindle towards the rear end of the body of the vehicle, means connecting the forward end of said arm to said spindle to cause said arm and spindle to turn as a unit about the axis of said spindle, means allowing vertical angular movements of said arm incorporated with said last mentioned connecting means, a grooved track-engaging wheel mounted on the rear end of said arm to rotate about a horizontal axis, and resilient means urging vertical angular movement of said arm in one direction.

2. In a toy vehicle comprising front steering wheels, driving wheels and an electric motor for driving the latter, the combination of a vertical angularly turnable spindle mounted towards the front end of the body of the vehicle in the central vertical plane of said body, means connecting said spindle to the steering wheels of the vehicle whereby angular movements imparted to said spindle impart directional movements to each of the steering wheels, a horizontal transverse pivot pin connected to an extremity of said spindle, a track having a pair of spaced guiding and electrical conducting members, a pair of substantially parallel and similar steering arms extending rearwardly from said spindle and individually pivoted on said pivot pin to allow independent vertical angular movements of said arms thereon, a substantially vertical pivot mounted on each of the free ends of said arms, a rotatable grooved track-engaging wheel swivelly mounted on each of said pivots, resilient means governing the vertical angular movements of said arms, and electric connections between said grooved wheels and said electric motor.

3. In a toy vehicle having front steering wheels, driving wheels and an electric motor for driving the latter and thereby the vehicle, the combination of a vertical angularly movable spindle mounted on the vehicle adjacent the front end thereof, and lying in the central longitudinal vertical plane of the vehicle, a horizontal transverse pivot pin fixed to said spindle, a pair of substantially similar arms individually freely pivotally mounted at one end on said pivot pin to allow a certain amount of lateral play of said arms, a substantially vertical pivot mounted on the other extremity of each of said arms, a forked bearing member rotatably mounted on each of said pivots a grooved wheel rotatably mounted in each of said forked bearing members, mechanism comprising co-operating toothed sectors connecting said vertical rotatable spindle to the steering wheels of the vehicle and adapted to impart directional movements thereto by angular movements of said spindle, twin electric current conveying route wires, springs coacting with said arms to maintain said wheels in running electrical contact with said route wires, and electrical connections between said grooved wheels and said electric motor.

4. In a toy vehicle comprising front steering wheels, driving wheels and means for driving the latter and thereby the vehicle, the combination of a vertical angularly turnable spindle mounted towards the front end of the body of the vehicle in

the central vertical plane of said body, means
connecting said spindle to the steering wheels of
the vehicle whereby angular movements imparted
to said spindle impart directional movements to
5 each of the steering wheels, a track, a steering
arm extending from said spindle towards the rear
end of the body of the vehicle, means connecting
the forward end of said arm to said spindle to
cause said arm and spindle to turn as a unit about

the axis of said spindle, means allowing vertical
angular movements of said arm incorporated with
said last-mentioned connecting means, and a
guide track-engaging wheel mounted on the rear
end of said arm and having interlocking guiding
engagement with said track whereby the track 5
will impart steering movement to said arm.

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