

No. 641,514.

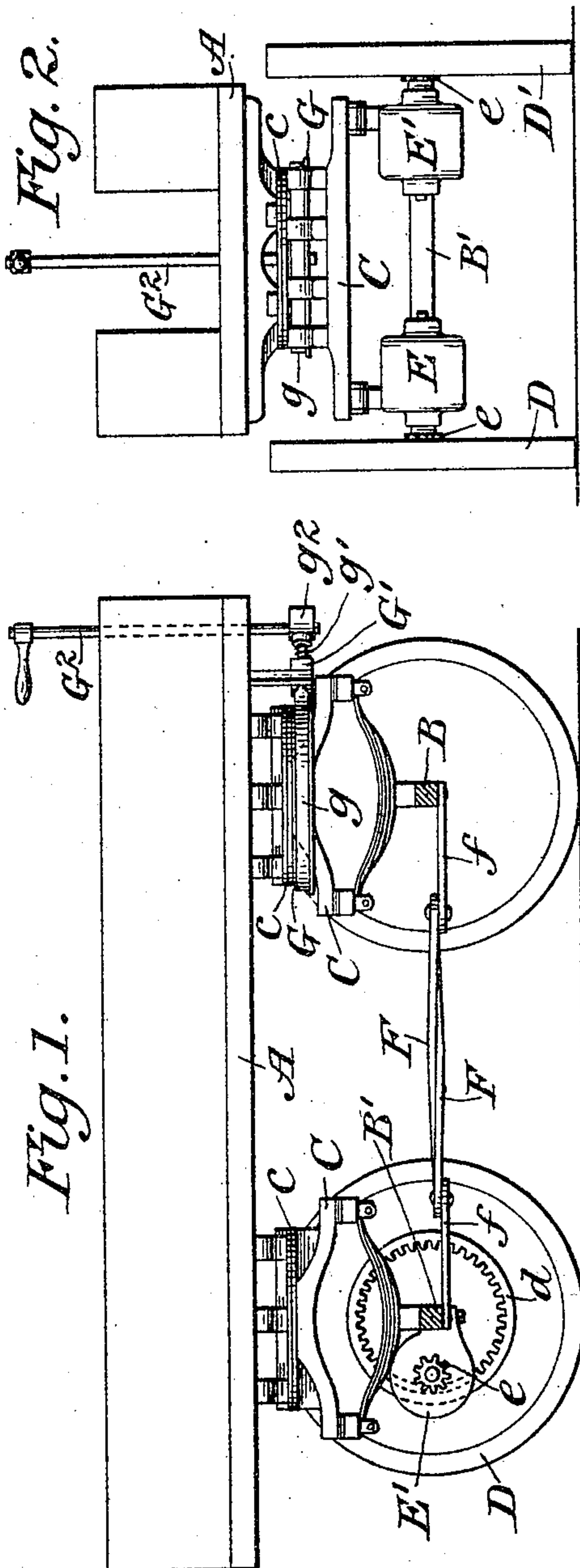
Patented Jan. 16, 1900.

C. W. HUNT.
MOTOR VEHICLE.

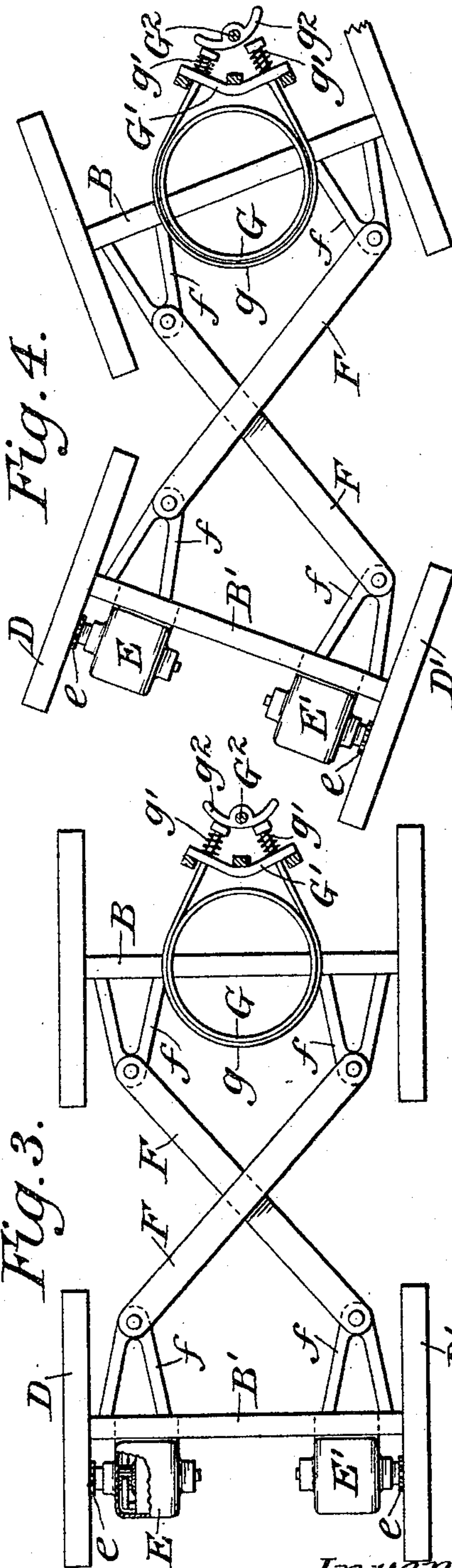
(Application filed Aug. 10, 1899.)

(No Model.)

3 Sheets—Sheet 1.



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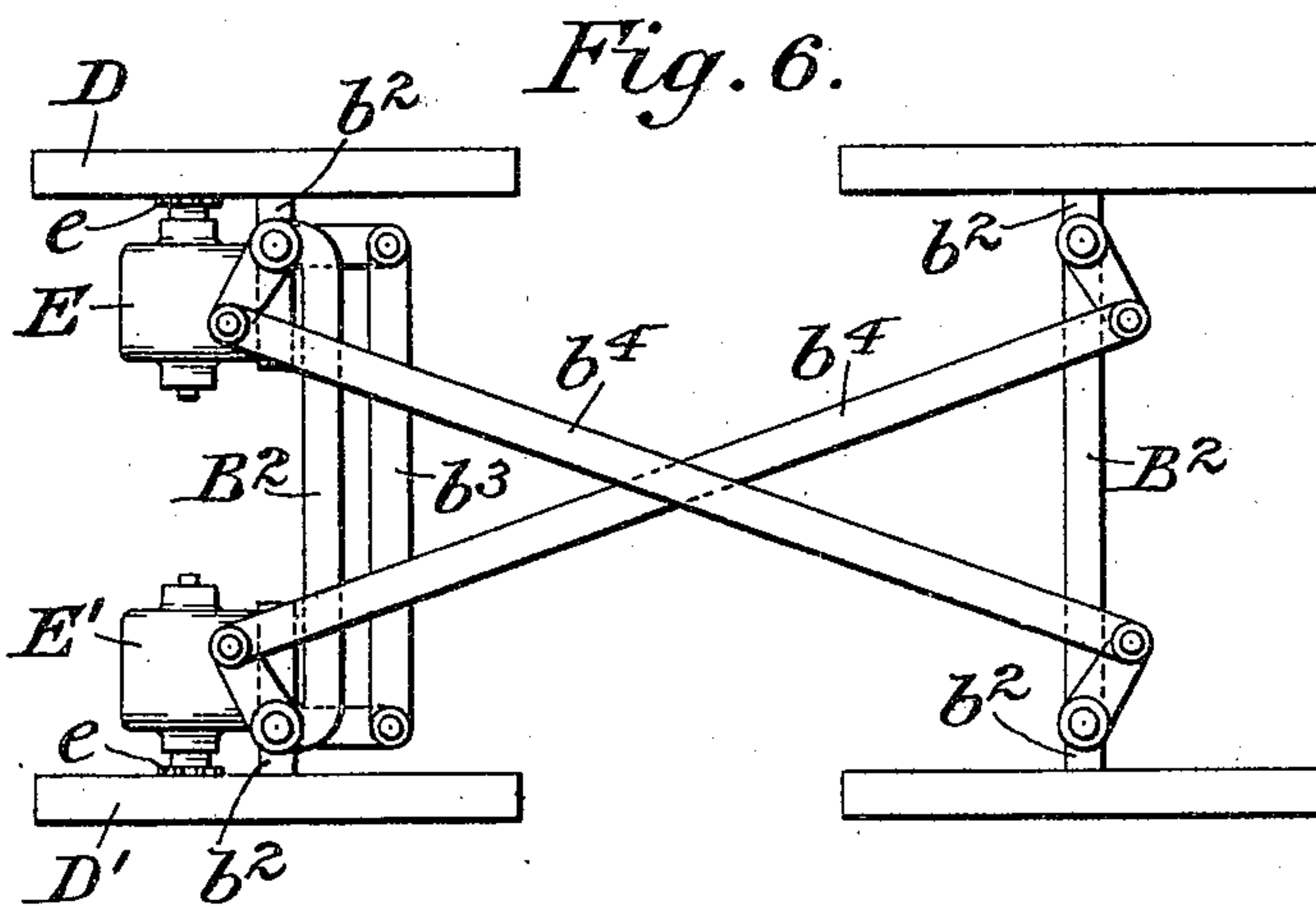
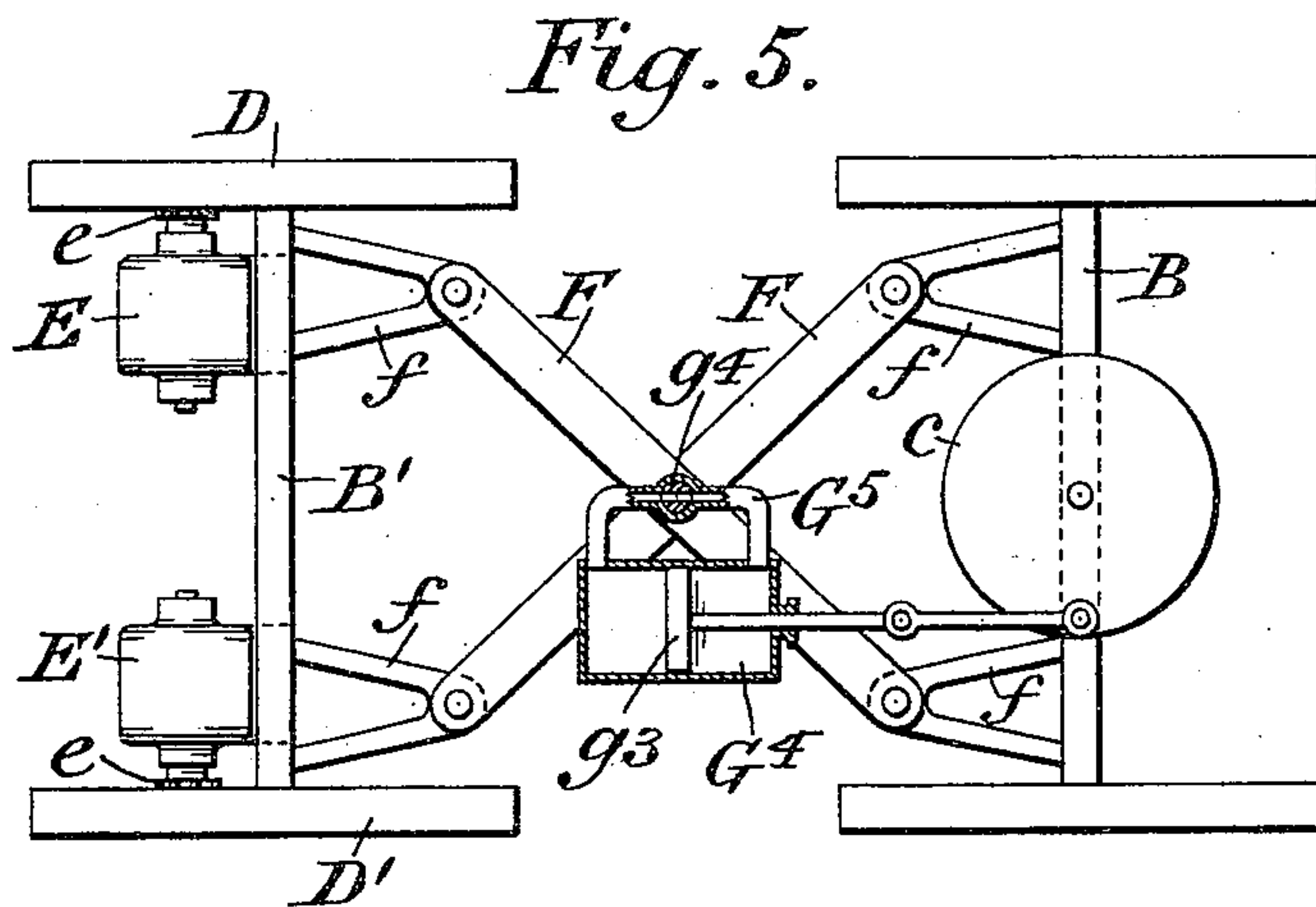
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3 Sheets—Sheet 2.



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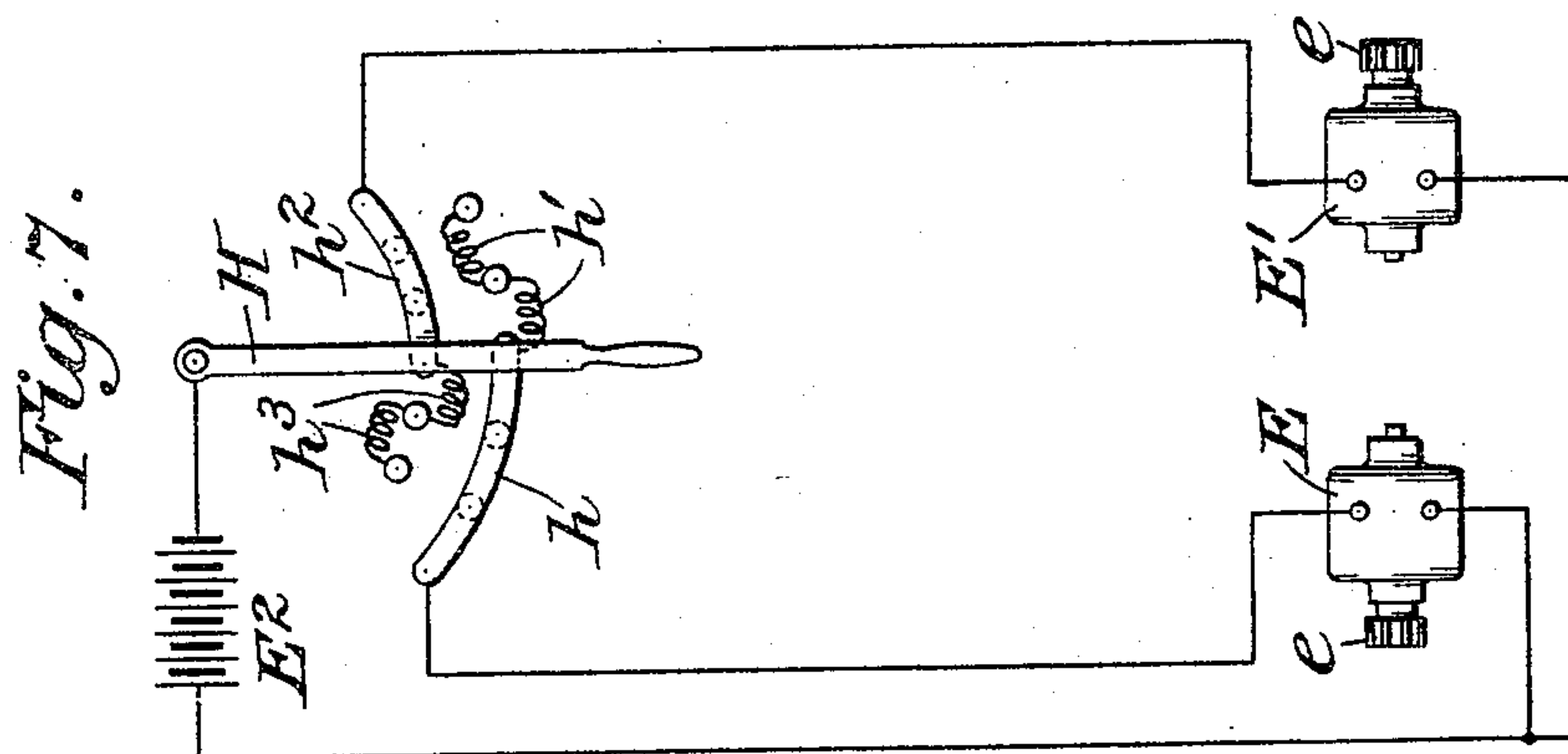
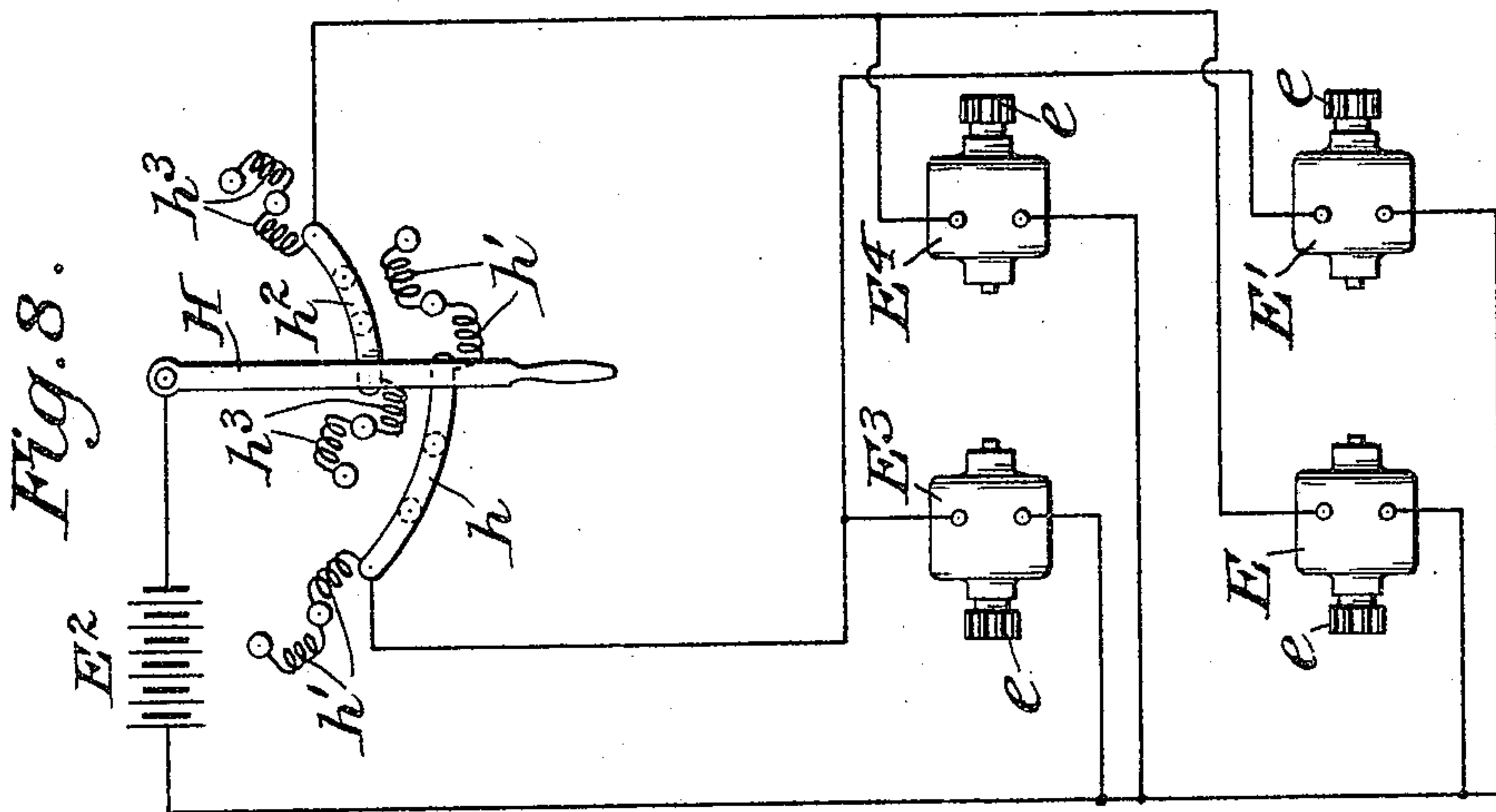
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

CHARLES W. HUNT, OF NEW YORK, N. Y.

MOTOR-VEHICLE.

SPECIFICATION forming part of Letters Patent No. 641,514, dated January 16, 1900.

Application filed August 10, 1899. Serial No. 726,774. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. HUNT, a citizen of the United States, residing in the city of New York, (West New Brighton,) in the borough of Richmond, State of New York, have invented certain new and useful Improvements in Motor Road-Vehicles, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to self-propelled vehicles which carry not only the driving mechanism, but also the means for determining the direction of movement—that is to say, the steering mechanism—and is particularly concerned with the means for determining the direction of movement.

In accordance with the invention two, at least, of the vehicle-wheels are driven by independent means, with provisions for retarding or accelerating the motion of one of the wheels relatively to the other, so that the vehicle is directed to one side or the other, as the case may be, means being also provided for retarding or checking the swinging of the wheels. In practice both axles of a four-wheeled vehicle are preferably mounted to swing in substantially horizontal planes about vertical axes and are connected by links, so that displacement of one axle in a horizontal plane is transmitted to the other and the vehicle thereby turned in a relatively small circle, and various other subsidiary devices are employed in connection with the main feature of the invention, as more fully described hereinafter; but the invention is not to be regarded as restricted to such devices, it being evident that it is capable of embodiment in many different forms and with many different features of construction, according to convenience in manufacture and the requirements of the particular use for which the vehicle is intended.

In the accompanying drawings, in which for purposes of explanation of the nature of the invention one embodiment thereof is illustrated, Figure 1 is a view in side elevation of a vehicle to which the invention is applied, with the rear wheels removed and the axles in section. Fig. 2 is a rear end elevation of the vehicle shown in Fig. 1. Fig. 3 is a plan view showing the wheels and axles

with their coöperating parts. Fig. 4 is a similar view, but with the parts in different positions. Fig. 5 is a view similar to Fig. 3, but showing a different form of brake or retarding device. Fig. 6 is also a similar view illustrating the application of the invention to a vehicle having its wheels mounted on stub-axles. Fig. 7 is a partial diagrammatic view illustrating means for controlling the motors shown in Figs. 1, 2, 3, and 4; and Fig. 8 is a similar view illustrating the application of a motor to each of the four wheels and controlling devices therefor.

The body A of the vehicle will of course be suited in all cases to the use to which the vehicle is to be put and will be supported upon the axles either directly or with intervening springs in any suitable manner. As represented in Figs. 1 and 2 of the drawings, however, a suitable spring-frame C is secured to each of the axles B B' and receives the weight of the body through a suitable ring or fifth-wheel, as indicated at c, a suitable pivot being provided as usual, about which the axle or the axle with the spring-frame is free to swing in a substantially horizontal plane. Each of the wheels D D' on the axle B' is arranged to be driven independently of the other by a driving means, such as an electric motor E or E', any suitable intermediate mechanism being provided, such as the gear d, secured to the vehicle-wheel and engaged by a pinion e, connected to the rotating part of the motor. The driving means for each wheel is controllable independently of the other by any suitable means, such as the means hereinafter described, so that each wheel can be driven independently of the other and its speed accelerated or retarded relatively, according to the direction in which it is desired to have the vehicle move. When the axle, which in the arrangement shown in Figs. 1, 2, 3, and 4 extends from side to side and has journaled thereon the independently-driven wheels, is mounted to swing in a substantially horizontal plane, as also indicated in said figures, the other axle B is also preferably mounted to swing in a substantially horizontal plane and is connected with the axle B' either directly or through the driving mechanism or otherwise, so that the diagonally-opposite wheels swing together, but in opposite direc-

tions, and thereby facilitate the turning of the vehicle in a small circle. As a convenient means for connecting the two axles links F may be employed, as shown in the drawings, such links being preferably pivoted on bracket-arms f , secured to the axles B and B', so that such links shall be always tangent to the arc of a circle described about the center of oscillation of each axle, and the free movement of the parts shall not be interfered with at any point in their oscillation.

In order that the vehicle may be at all times under perfect control, it is desirable to provide some sort of braking device to retard or check the swinging of the axle or axles under the separate action of the motors and especially to hold the axle or axles against swinging when the vehicle is moving in a straight line. It is obvious that such a device can be applied in many different ways, that shown in Figs. 1, 3, and 4 of the drawings being merely one convenient form. As there shown, a brake-drum G' is secured to the forward axle B or to the frame which swings with it, and a brake-strap g , which coöperates with the drum, is so arranged as to be under control of the driver of the vehicle. Preferably the brake is normally set and is relieved by the driver. For this purpose the ends of the brake-strap g may be supported by springs g'' , which bear upon a fixed part G' and normally hold the brake-strap tightly against the drum. A cam-arm g^2 , secured to the brake-shaft G^2 , is arranged to compress one or the other of the springs g' and so relax the brake band or strap g on one side or the other, according to the direction in which the axle is to be swung. Another form of braking device is shown in Fig. 5, in which the fifth-wheel c is connected to the plunger g^3 of a dash-pot G^4 , the valve g^4 in the pipe G^5 determining the speed of movement of the plunger. It will be evident that with such an arrangement as this the time required to make a turn with the vehicle will be practically the same under all circumstances, so that the greater the speed of the vehicle the greater will be the radius of the turn, and the liability to upset, therefore, will not be greater at high speed than at low speed. Many other forms of braking or clamping devices will readily suggest themselves as substitutes for the form just described.

So far as the present invention is concerned the particular character of the separate motors employed and the particular character of the motor-controlling devices are alike immaterial. A controlling device similar in general character to that shown in the drawings is well adapted for the purpose, however, and will now be described, reference being had particularly to Fig. 7 of the drawings. As there represented, the two motors E and E' are connected in common to a suitable source of electromotive force, as at E^2 , and to a movable switch-lever or contact-arm H, which is adapted to complete the circuit to both motors through separate conductors. Each of said

conductors terminates in a continuous contact-plate $h h^2$ and a series of resistances $h' h^3$, the continuous contact-plate and series of resistances of each conductor being similarly arranged with relation to the motors, but oppositely disposed as regards their relative position, while the continuous contact-plates overlap somewhat, so that when the switch-lever or contact-lever H is in its normal and central position it is in contact with both of said contact-plates and current is distributed equally to the two motors. A movement of the contact-arm or switch-lever H to one side or the other throws more or less resistance into the circuit of the corresponding motor, so that its motion is retarded relatively to the motion of the other motor, and the other wheel is driven relatively faster, thereby turning the vehicle quickly toward the other side. A reversal of the switch-lever or contact-arm will at first equalize the movement of the two motors, driving the vehicle in a straight line and thereafter if continued will turn the vehicle in the opposite direction. It will be obvious that, if desired, an independent motor might be applied to each of the four wheels of the vehicle, the connections of the motors to the controller being so arranged as to cause the motors to operate in couples in such a way as to secure the more rapid turning of the vehicle without the use of connecting-links between the two axles. In this arrangement, as represented in Fig. 8, the motors E and E' are supposed to be on one side of the vehicle and the motors E' and E' on the other side of the vehicle, the motors being connected, respectively, to the corresponding wheels of the vehicle. By reference to Fig. 4 it will be evident that the motors on opposite sides of the vehicle front and rear must operate together, or, in other words, that the motors E' and E' must be retarded relatively to the motors E and E', or vice versa. Accordingly the two motors E' and E' are connected to the common contact-plate h and its series of resistances h' , while the motors E and E' are likewise connected to the common contact h^2 and its series of resistances H^3 . A movement of the switch-lever or contact-arm H to one side or the other will therefore produce a movement of two axles B and B' in a direction to turn the vehicle toward one side or the other in precisely the same manner as if the two axles were connected by the crossed links F, as shown in Figs. 3 and 4.

In the operation of the improved vehicle shown in Figs. 1, 2, 3, and 4 the brake $G g$ is released. Immediately after the release of the brake or simultaneously therewith the controller-handle H is moved in the proper direction to retard the motion of one of the motors relatively to the other, thereby giving the desired direction of movement to the vehicle.

It is evident that it is immaterial, so far as the invention is concerned, whether the main axles swing or whether the wheels are mount-

ed to swing on stub-axles which are supported upon the ends of a fixed main axle or upon the running-gear frame. In Fig. 6 the wheels are shown as journaled on stub-axles b^2 , which swing upon the ends of fixed axles or parts B^2 of the running-gear frame, the rear stub-axles carrying the motors and being connected with each other by arms and a link b^3 and with the front stub-axles by links b^4 , so that the diagonally-opposite front and rear wheels swing together in opposite directions.

Many other forms of devices will readily suggest themselves in view of the foregoing, and it is therefore to be understood that the invention is not to be restricted to the construction and arrangement of parts herein shown and described.

I claim as my invention—

1. In a vehicle, the combination of wheels mounted to swing about a substantially vertical axis, independent driving mechanisms for said wheels, means to control said driving mechanisms whereby one of said wheels is retarded or accelerated with relation to the other of said wheels, and means to retard or check the swinging of the wheels.

2. In a vehicle, the combination of wheels mounted to swing about a substantially vertical axis, independent driving mechanisms

for said wheels, means to control said driving mechanisms whereby one of said wheels is retarded or accelerated with relation to the other of said wheels, a brake normally checking or retarding the swinging of the wheels, and means to relieve the brake.

3. In a vehicle, the combination of wheels mounted to swing about a substantially vertical axis, independent electric motors for said wheels, means to vary the current through each of said motors, whereby one wheel is retarded or accelerated with relation to the other wheel, and means to retard or check the swinging of the wheels.

4. In a vehicle, the combination of wheels mounted to swing about a substantially vertical axis, independent electric motors for said wheels, a single-current controller and connections therefrom to said motors whereby the current may be divided as desired between said motors and one wheel relatively retarded or accelerated, and means to retard or check the swinging of the wheels.

This specification signed and witnessed this 2d day of August, A. D. 1899.

CHARLES W. HUNT.

In presence of—

E. JENKINS HANDLEY,
ANDREW H. SCOBLE.