No. 713,313. Patented Nov. 11, 1902.

A. S. KROTZ.

AUTOMOBILE.

(Application filed Apr. 21, 1902.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1

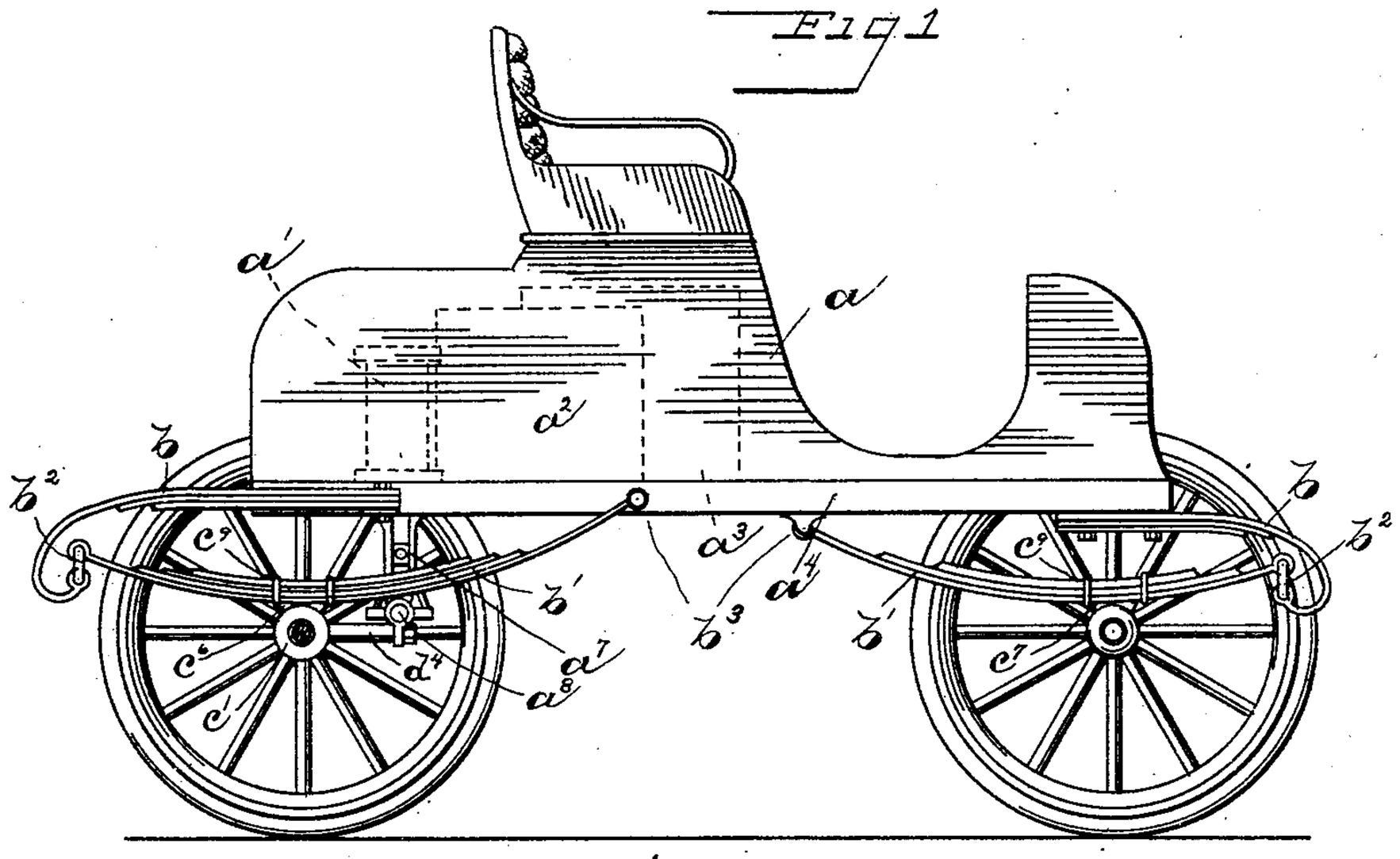


Fig. 2

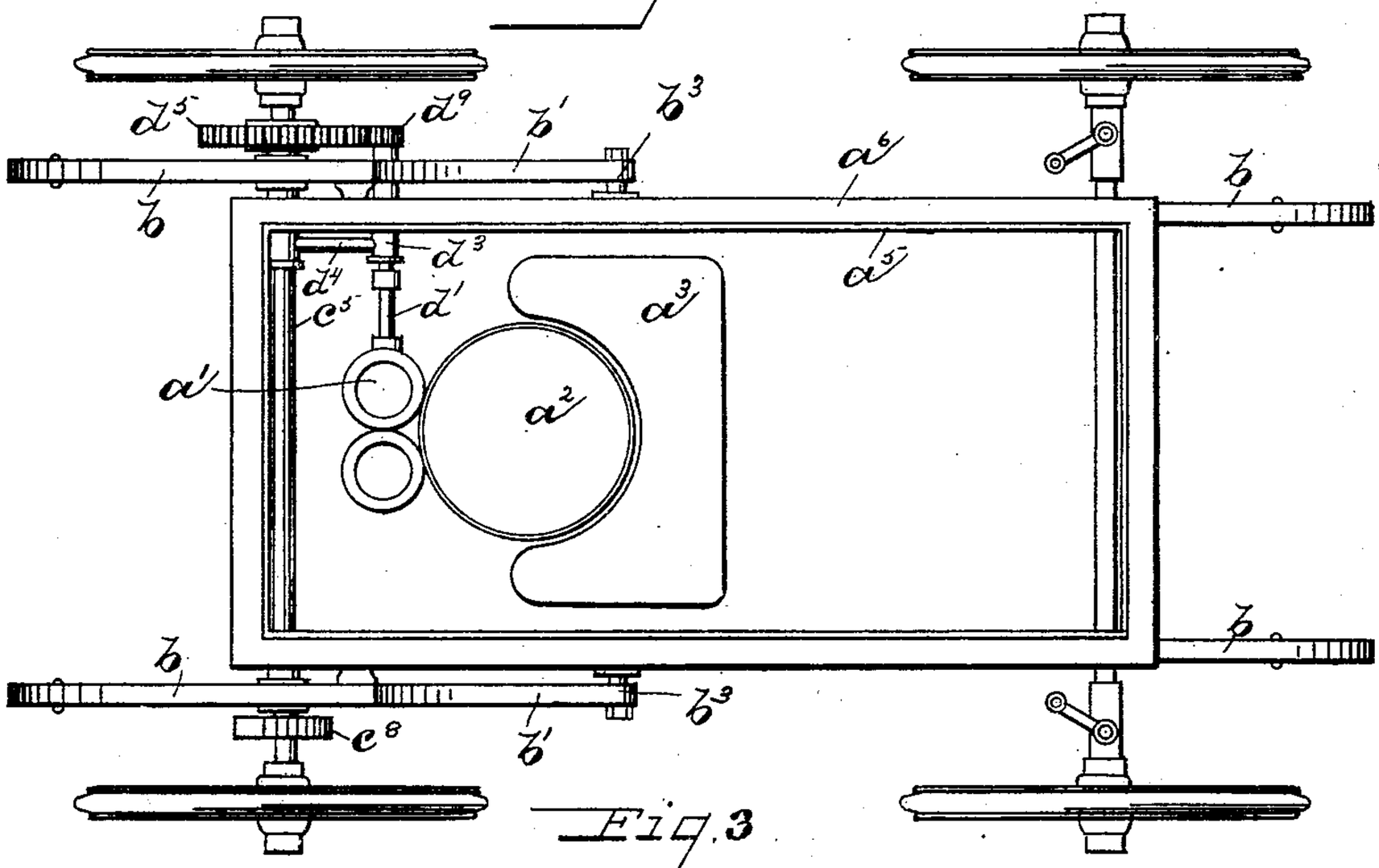
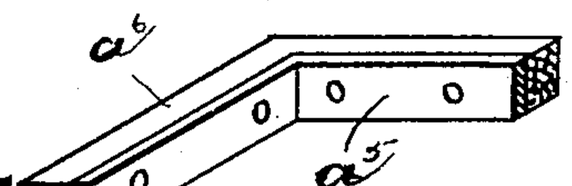


Fig. 3



WITNESSES:
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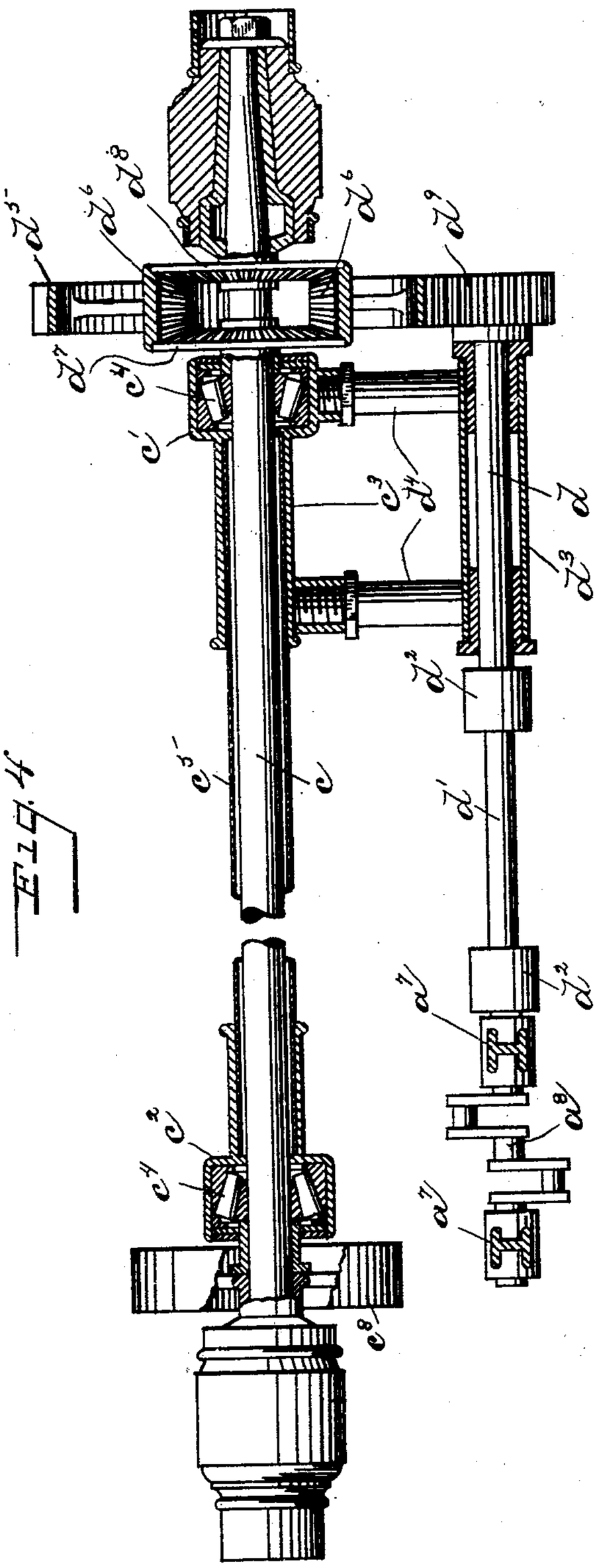

FIG. 4.

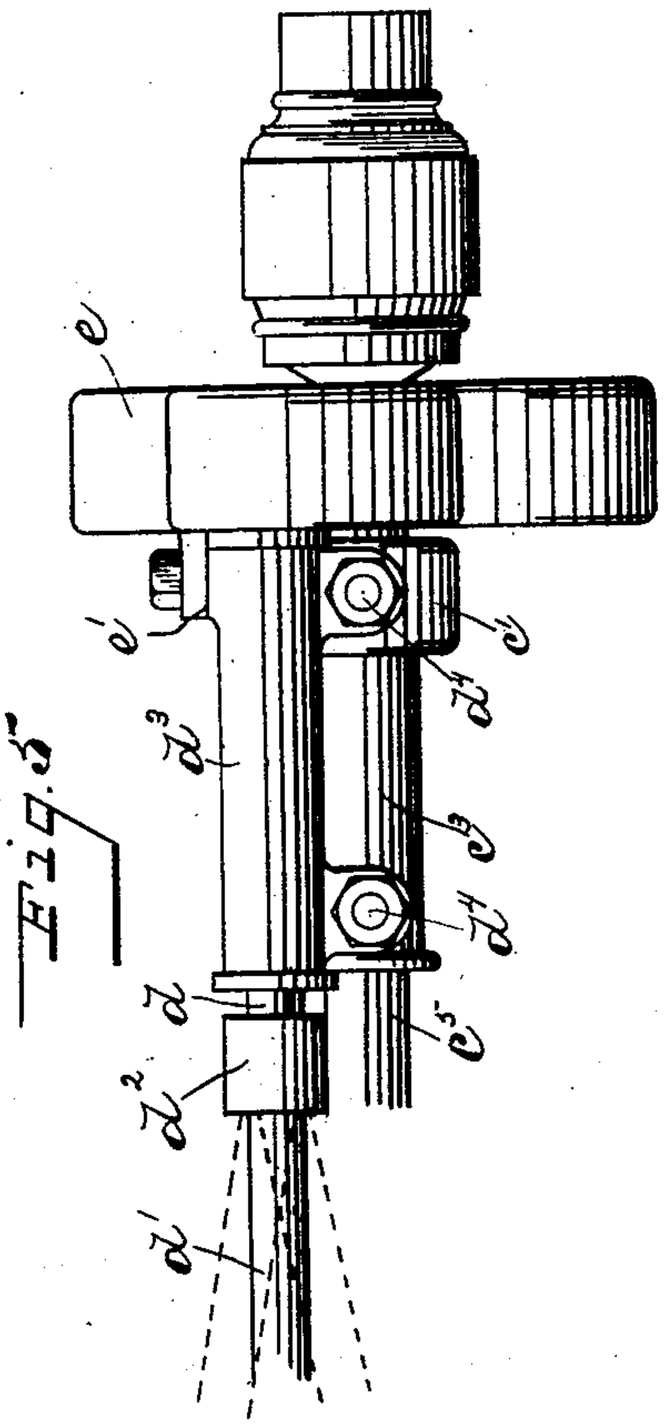

FIG. 5.

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(Application filed Apr. 21, 1902.)

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Fig. 6

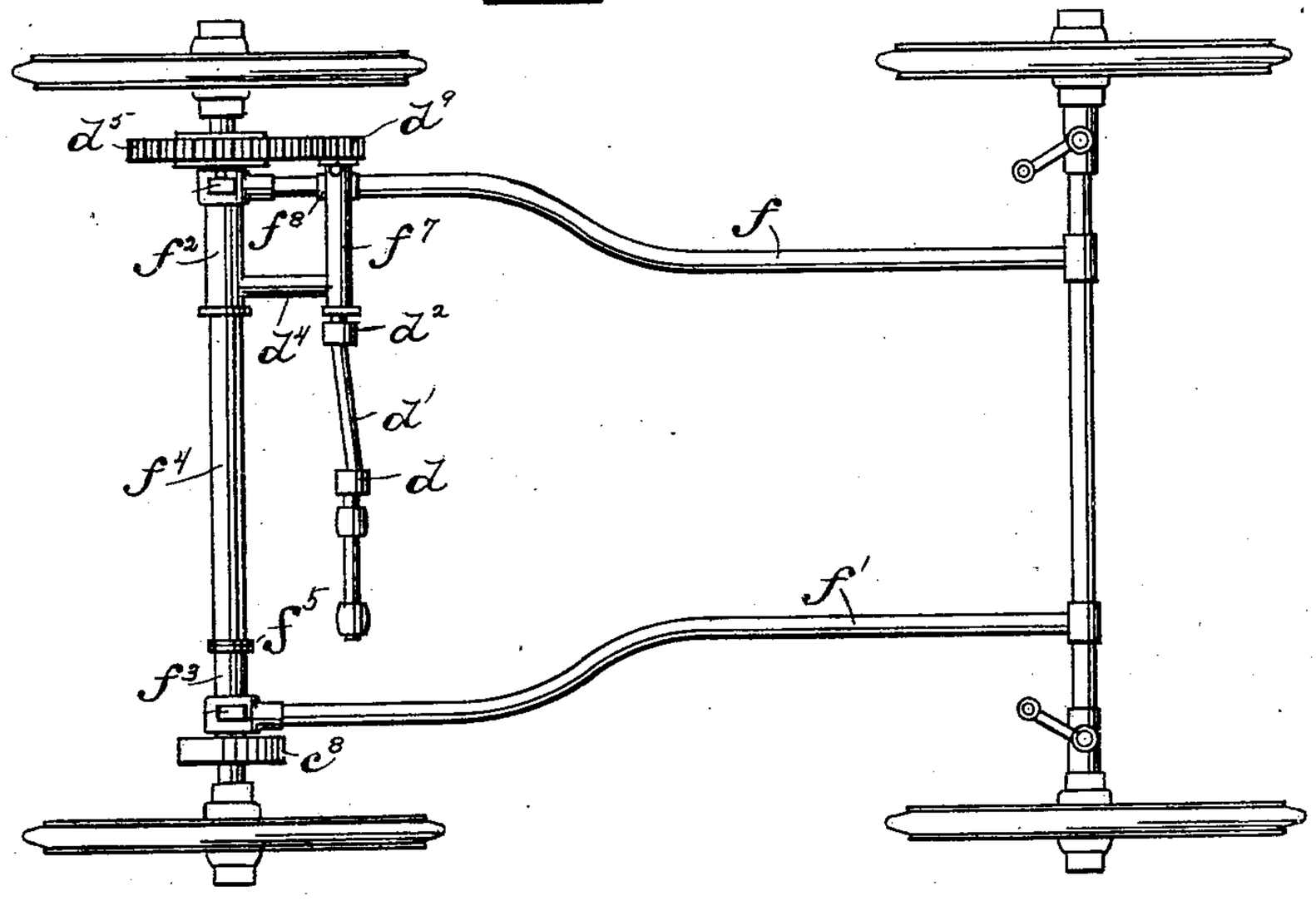

Fig. 7

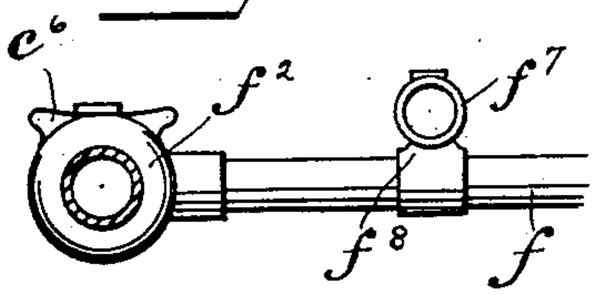

Fig. 8

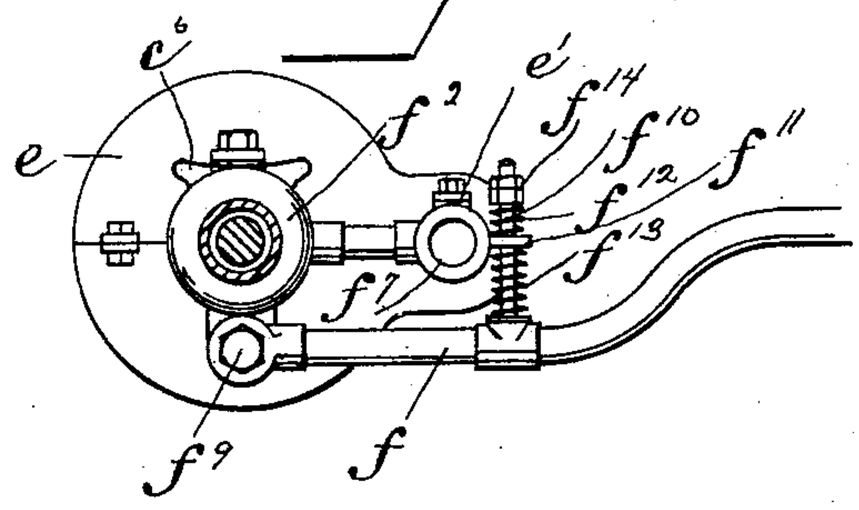

Fig. 6a

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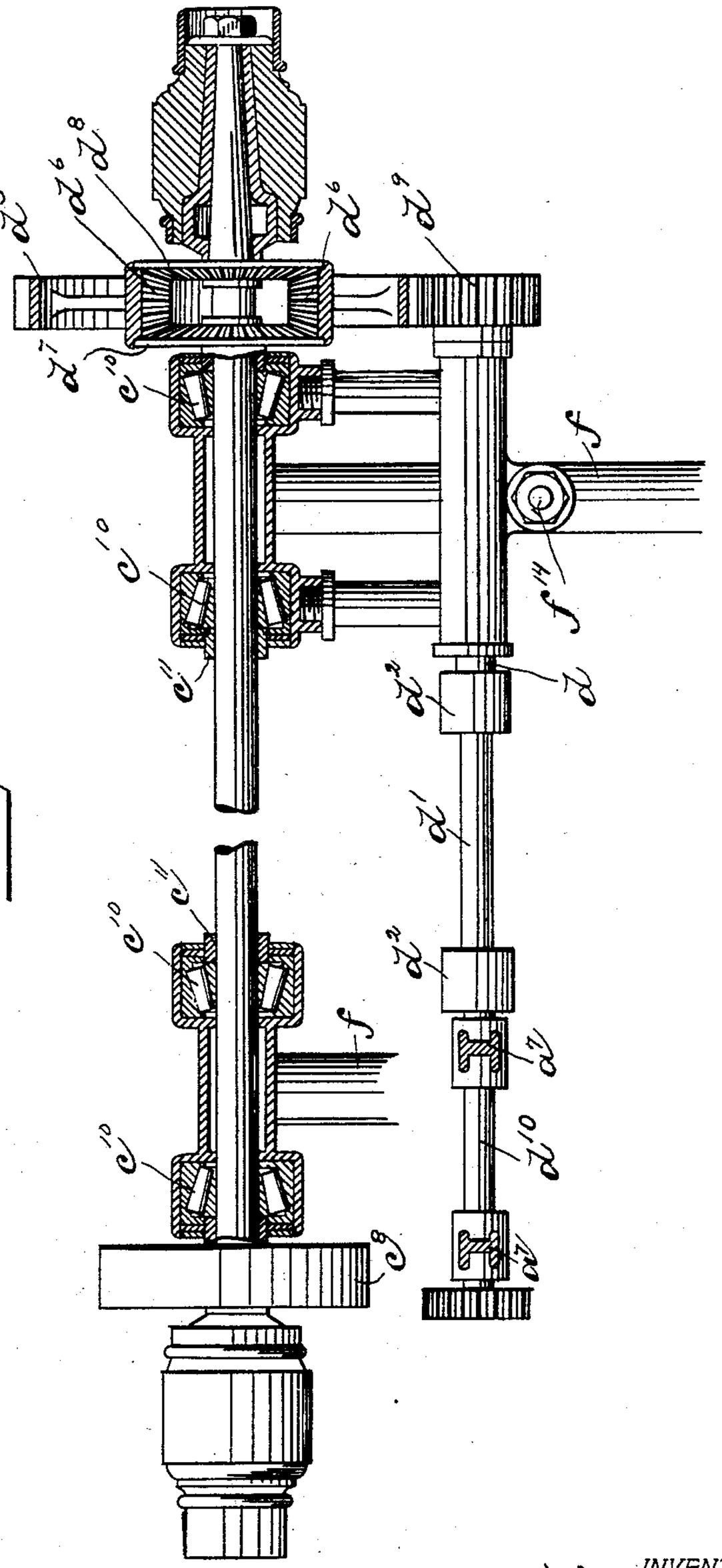

Fig. 9.

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UNITED STATES PATENT OFFICE.

ALVARO S. KROTZ, OF SPRINGFIELD, OHIO, ASSIGNOR OF ONE-HALF TO PAUL A. STALEY, OF SPRINGFIELD, OHIO.

AUTOMOBILE.

SPECIFICATION forming part of Letters Patent No. 713,313, dated November 11, 1902.

Application filed April 21, 1902. Serial No. 103,924. (No model.)

To all whom it may concern:

Be it known that I, ALVARO S. KROTZ, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful improvements in Automobiles, of which the following is a specification.

My invention relates to automobiles, and more especially to improvements in the frame structure and operating parts for transmitting the power to compensate for the jars and strains incident to the travel of the machine.

In view of the service required in transmitting the power and taking into consideration the weight of the load to be carried, especially when a steam or gasolene motor is employed, it will be understood that it is important not only to provide for the easy carriage of the motor, as well as the comfort of the passenger, but also that provision must be made to compensate for the unequal strains and jars caused by the varied conditions of the road over which the machine is required to travel.

The object of my invention is to provide an improved frame and transmission device so combined as to lessen and simplify the parts and to so construct and adapt the same as to compensate for the unequal strains and jars and at the same time give a strong and durable construction; and it is more especially adapted for use in a machine where steam or gasolene is employed as a motor, although it may be used with like advantages where other motive power is used.

In my construction I dispense with the usual driving-chain and transmit the power through a shaft directly and flexibly connected with the crank-shaft of the motor, said shaft being so supported and flexibly connected with the crank-shaft as to compensate for the varied movement or vibration of the motor-carrying body.

My invention consists in the constructions and combinations of parts hereinafter described, and set forth in the accompanying drawings, in which—

Figure 1 is a side view of a machine with the near wheels omitted to give a better view of the construction embodying my invention. Fig. 2 is a plan view of same. Fig. 3 is a detail of a portion of the bed-base, showing the preferred form of construction. Fig. 4 shows the rear axle and the supporting-frame with driving-shaft and gears partly in section. Fig. 5 is another detail of one end of said axle and shaft, showing the movement of said shaft through the universal joint. Fig. 6 is a modification showing side bars or reaches extending from the rear to the front axles. Fig. 6^a shows flexible connection of said reaches to front axle. Fig. 7 is a detail of this modification, showing body-rest and journal for the driving-shaft; and Fig. 8 is another detail showing spring attachment on the driving-shaft support. Fig. 9 is another modification, omitting the tube between the corner-pieces and showing connection for explosive-engine.

Like parts are represented by similar letters of reference in the several views.

In the drawings, a is the body, preferably of the shape shown to carry the engine a', the boiler a^2, and the supply-tank a^3 under and to the rear of the seat. To give a substantial and firm support for the engine, boiler, and tank, as well as the load which it is designed to carry, I preferably form the base a^4 for the body of forged metal a^5, bolted or otherwise secured to a wooden frame a^6, as more particularly shown in Fig. 3. This gives a very strong construction to withstand the strains and jars without employing the usual bars or reaches between the axles of the machine, and to further carry out this idea I preferably employ springs of the character shown in the drawings, consisting of two portions b and b', pivoted together at their outer ends by the loop-joint b^2, the upper portions b being securely bolted at their inner ends to the ends of the base a^4. The lower portions are secured to the seats c^6 and c^7 by the clip c^9 and are pivoted at their inner ends b^3 toward the longitudinal center of the base a^4. This construction not only distributes the load, but the action of the springs is such that the pivoted ends bear toward each other and toward the longitudinal center of the machine and when the machine in

its travel meets with an obstruction will compensate for the shock, steadying the body and keeping it from rocking.

The corner-pieces c' and c^2, with their extensions c^3 on the rear axle c, are each preferably provided with a well-known form of roller-bearing c^4, and said corner-pieces, with their extensions, are rigidly connected by the tube c^5, through which said axle extends. The body-spring seats c^6 are preferably formed on the corner-pieces c' and c^2. The engine-frame a^7 extends below the base of the body and normally carries its crank-shaft a^8 in a line parallel with the rear axle and is connected with the driving-shaft d by the intermediate shaft d' and the universal couplings d^2. I have not shown these couplings in detail, as any well-known form of universal couplings may be used. When an explosive-engine is employed, a counter-shaft d^{10}, journaled to the engine-frame or body-base and driven by the crank-shaft, may be used, said counter-shaft being flexibly connected to the driving-shaft d by the intermediate shaft d' and the universal couplings d^2, as shown in Fig. 9. The driving-shaft d is journaled in the frame d^3, attached to the corner-piece c' and its extension c^3 by the laterally-extending arms d^4. Adjacent to the corner-piece c^2 I attach to the rear axle the brake-wheel c^8, and adjacent to the corner-piece c' I place a differential gear consisting of a spur-gear d^5, with the bevel-pinions d^6, journaled at right angles to its inner periphery, operating two bevel-gears d^7 and d^8, facing each other, the bevel-gear d^7 being keyed to the axle and the hub of the bevel-gear d^8 being extended and formed integrally with the hub-box of the adjacent wheel, the construction being such that the rear wheels will operate independently of each other. The pinion d^9 on the driving-shaft d meshes with the spur-gear d^5 to drive the machine. The gear casing or cover e is bolted to the corner-piece c' and to the driving-shaft support d^3 at e' and moves with said support, thereby maintaining its relative position to the gears. It will be seen that as the corner-pieces and their connecting-tube extend between the brake-wheel upon the one side and the differential gear upon the other and the supporting-frame for the driving-shaft is attached to one of said corner-pieces and its extension the shaft will be firmly held in alinement with the rear axle, and said frame being free to swing on said axle within the limits allowed by its connection to the spring, the driving-pinion will always remain in mesh with the spur-gear under the vibration caused by the travel of the machine over uneven roads, and the universal couplings being between the crank-shaft and the driving-shaft compensate for the vibration of the body and torsional strains and permit the continuous transmission of the power.

In Fig. 6 I have shown a modification in which I employ the side bars f and f', pivoted to the rear axle by the corner-pieces f^2 and f^3, said corner-pieces being connected by the tube f^4, said tube being rigidly attached to the corner-piece f^2 and pivotally connected at f^5 to the corner-piece f^3, and the other ends of said side bars are flexibly connected at f^6, Fig. 6^a, to the front axle, said pivotal connection on the rear axle and flexible connection on the front axle being more particularly described in my application, Serial No. 67,391, filed July 8, 1901. The driving-shaft frame f^7 may be rigidly connected at f^8 with the side bar f, as shown in Figs. 6 and 7, or the side bar f may be pivoted at f^9 to the corner-piece f^2 and the spindle f^{10}, attached to said side bar, extending upwardly through the perforated projection f^{11}, with the springs f^{12} and f^{13}, above and below said projection, held in place by the nuts f^{14}. This construction will give an elastic support to said frame and steady it in its position.

In Fig. 9 I have shown the corner-pieces without the tubular connection between them. In this construction I employ the double roller-bearings c^{10} in each corner-piece, held in place by the collars c^{11}.

It will be seen that when desired the machine may be given increased strength by employing the side bars in addition to the body with its base and springs, as hereinbefore described, the rear body-springs being secured to the corner-pieces and the front springs preferably on the flexible connections of the side bars to the front axle. The side bars being yieldingly connected to the front axle and pivotally connected to the rear axle and to each other, provision is thereby made to relieve the frame from the jars and strains incident to the travel of the machine, and when employed in connection with the springs and their compensating action in relation to the body, as hereinbefore described, gives a construction of great strength and yet of sufficient flexibility to compensate for the jars and strains incident to the use of the machine. It will be further seen the machine is adapted to run in either direction, so that the terms "front" and "rear" axle are used simply for convenience in the specification.

Having thus described my invention, I claim—

1. The combination of a body, a motor and driving-shaft mounted on said body, an axle, rigidly-connected corner-pieces journaled on said axle, a frame rigidly connected to said corner-pieces, said shaft being flexibly extended and journaled on said frame, and supporting-springs for said body rigidly attached to said corner-pieces, whereby said frame and shaft are elastically held in position under the vibration of the machine, substantially as specified.

2. The combination of an axle, a differential gear as described, rigidly-connected corner-pieces journaled on said axle, a frame rigidly connected to said corner-pieces, a body, a motor and driving-shaft mounted on said

body, said shaft being flexibly extended and journaled on said frame, a pinion on said shaft extension adapted to mesh with said differential gear, and supporting-springs for said body rigidly attached to said corner-pieces to elastically hold said shaft in alinement and said pinion in mesh with the differential gear under the vibration of the machine, substantially as specified.

3. The combination with the front and rear axles, side bars flexibly connected to one of said axles and pivotally connected with the other, said pivoted connection comprising corner-pieces, one of which has a rigid extension pivotally connected to the other, of a body, a motor and driving-shaft on said body, said shaft being flexibly extended and journaled on the side bar of the corner-piece having said rigid extension, and supporting-springs for said body attached to said corner-pieces, substantially as specified.

4. The combination with the front and rear axles, side bars flexibly connected to one of said axles and pivotally connected with the other, said pivoted connection comprising corner-pieces and a tube through which the axle extends, pivotally connecting said corner-pieces, a frame rigidly attached to one of said corner-pieces having a journal elastically connected with one of said side bars, and a differential gear as described, of a body, a motor and driving-shaft on said body, said shaft being flexibly extended through said journal and having a pinion thereon adapted to mesh with said differential gear, and supporting-springs for said body attached to said corner-pieces, substantially as specified.

5. The combination of a body, a motor and a driving-shaft mounted on said body, an axle, rigidly-connected corner-pieces journaled on said axle, a differential gear on said axle outside of said corner-pieces, a frame rigidly connected to said corner-pieces, said shaft being flexibly extended and journaled on said frame, and supporting-springs for said body rigidly attached to said corner-pieces, whereby said frame and shaft are elastically held in position under the vibration of the machine, substantially as specified.

6. The combination of an axle, rigidly-connected corner-pieces journaled on said axle, a differential gear on said axle outside of said corner-pieces, a frame rigidly connected to said corner-pieces, a body, a motor and driving-shaft mounted on said body, said shaft being flexibly extended and journaled on said frame, a pinion on said shaft extension adapted to mesh with said differential gear, and supporting-springs for said body rigidly attached to said corner-pieces to elastically hold said shaft in alinement and said pinion in mesh with the differential gear under the vibration of the machine, substantially as specified.

7. The combination of an axle, rigidly-connected corner-pieces journaled on said axle, a differential gear on said axle outside of said corner-pieces, a frame rigidly connected to said corner-pieces, a body, a motor and driving-shaft mounted on said body, said shaft being flexibly extended and journaled on said frame, a pinion on said shaft extension adapted to mesh with said differential gear, and supporting-springs for said body rigidly attached to said corner-pieces, and a guard-casing for said gear and pinion rigidly attached to said frame, substantially as specified.

In testimony whereof I have hereunto set my hand this 17th day of April, A. D. 1902.

ALVARO S. KROTZ.

Witnesses:

CHAS. I. WELCH,

PERCY NORTON.