

No. 698,753.

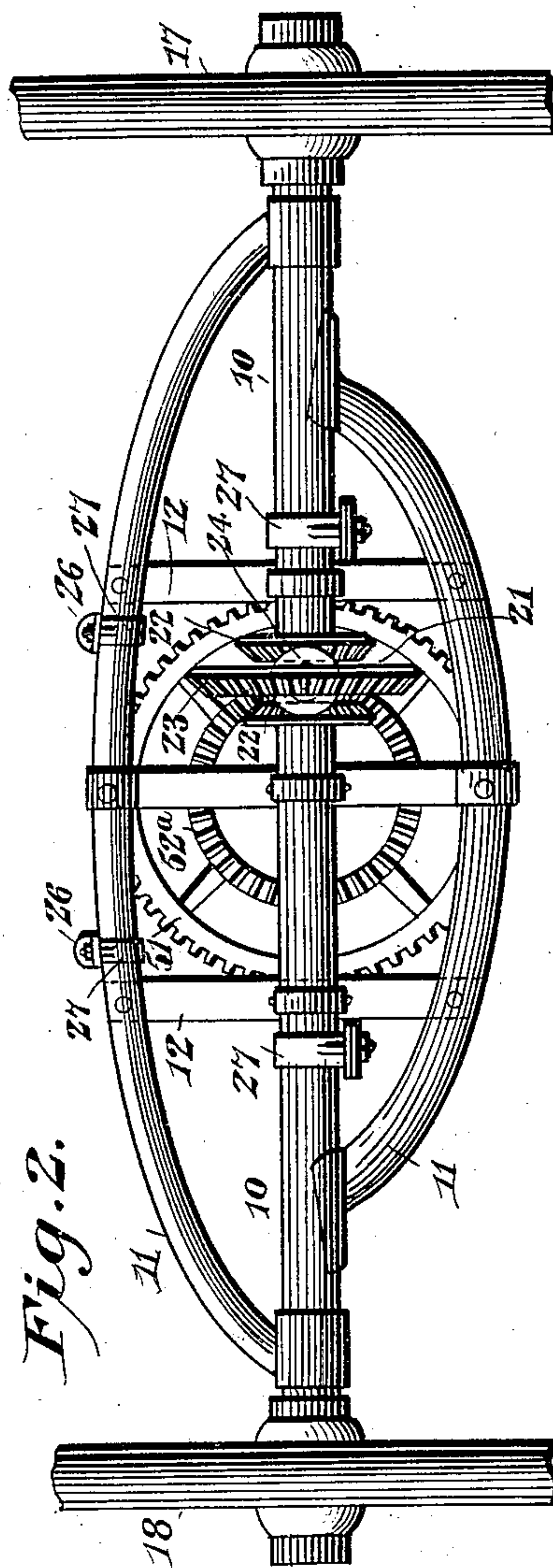
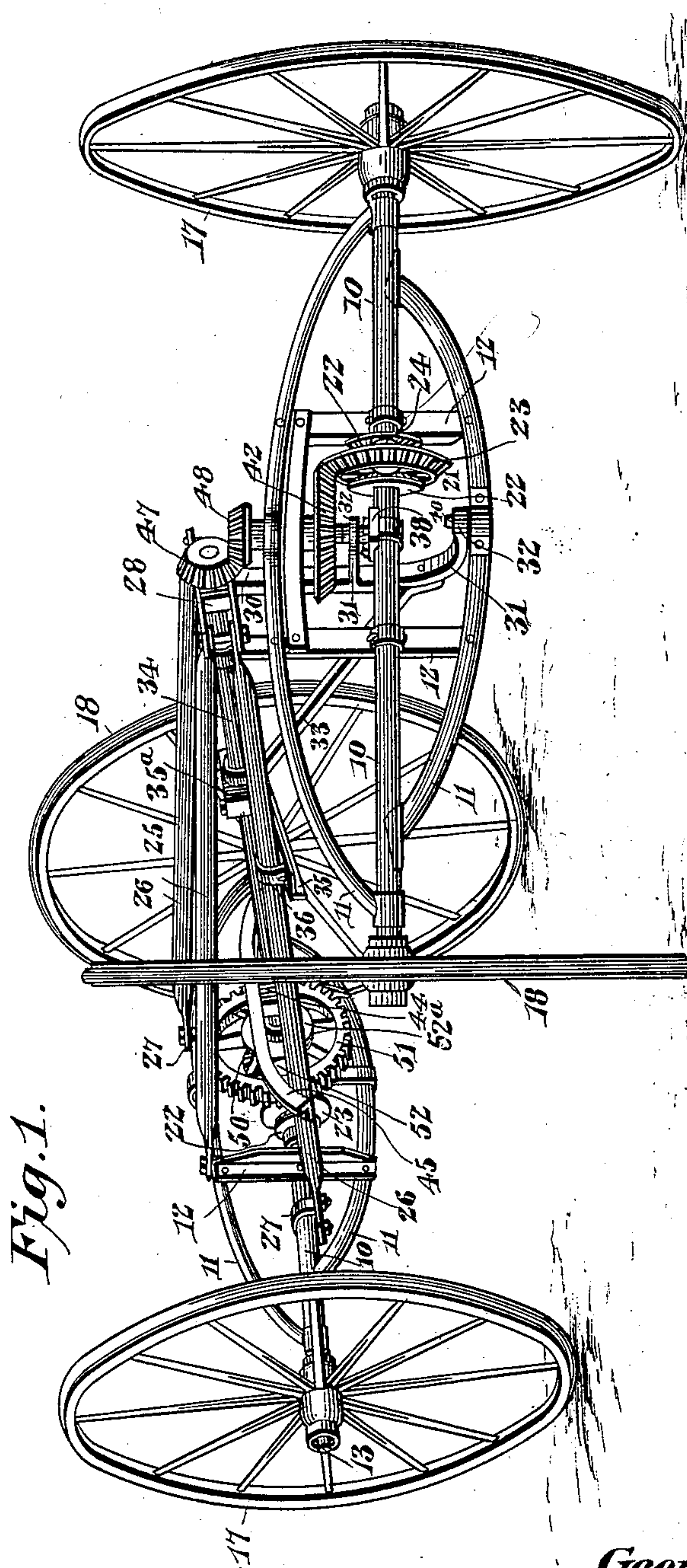
Patented Apr. 29, 1902.

G. W. SMITH.  
MOTOR VEHICLE.

(Application filed Aug. 28, 1901.)

(No Model.)

2 Sheets—Sheet 1.



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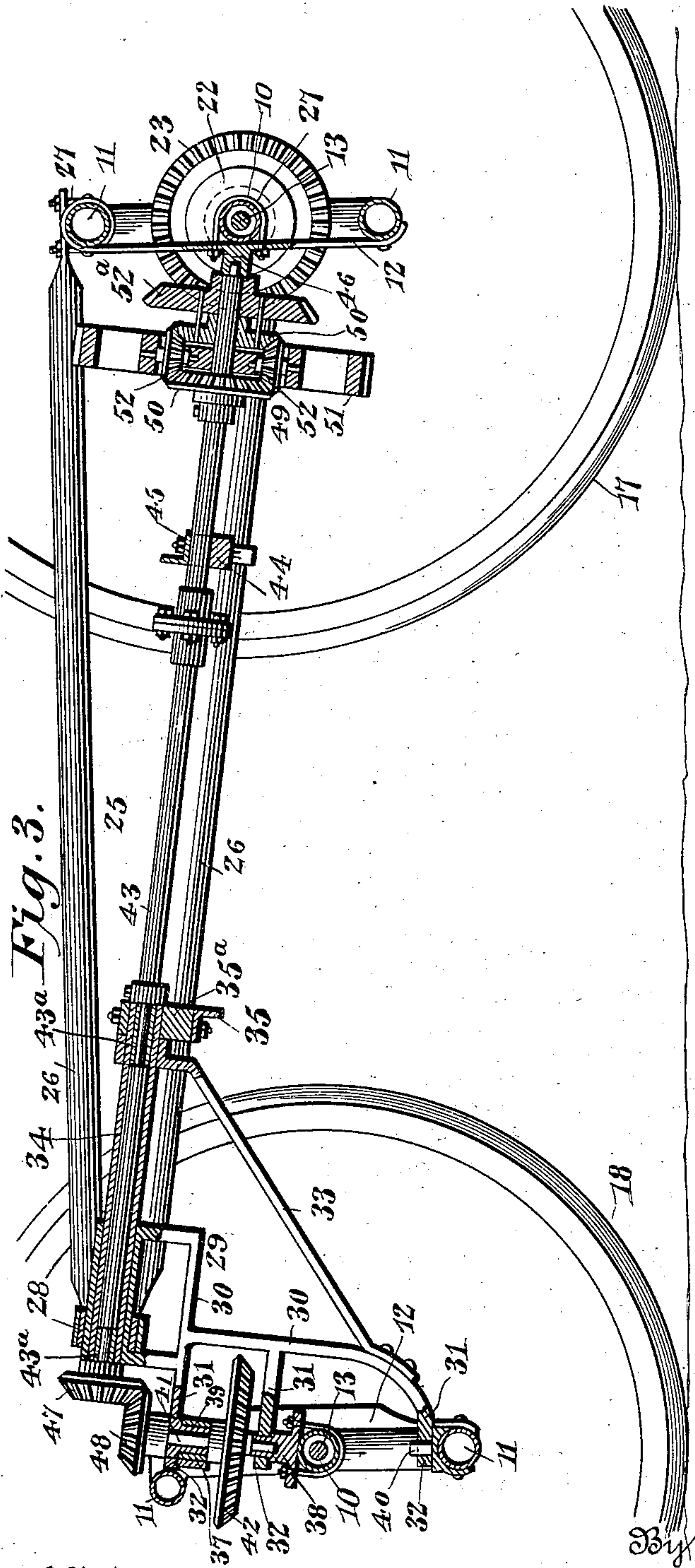
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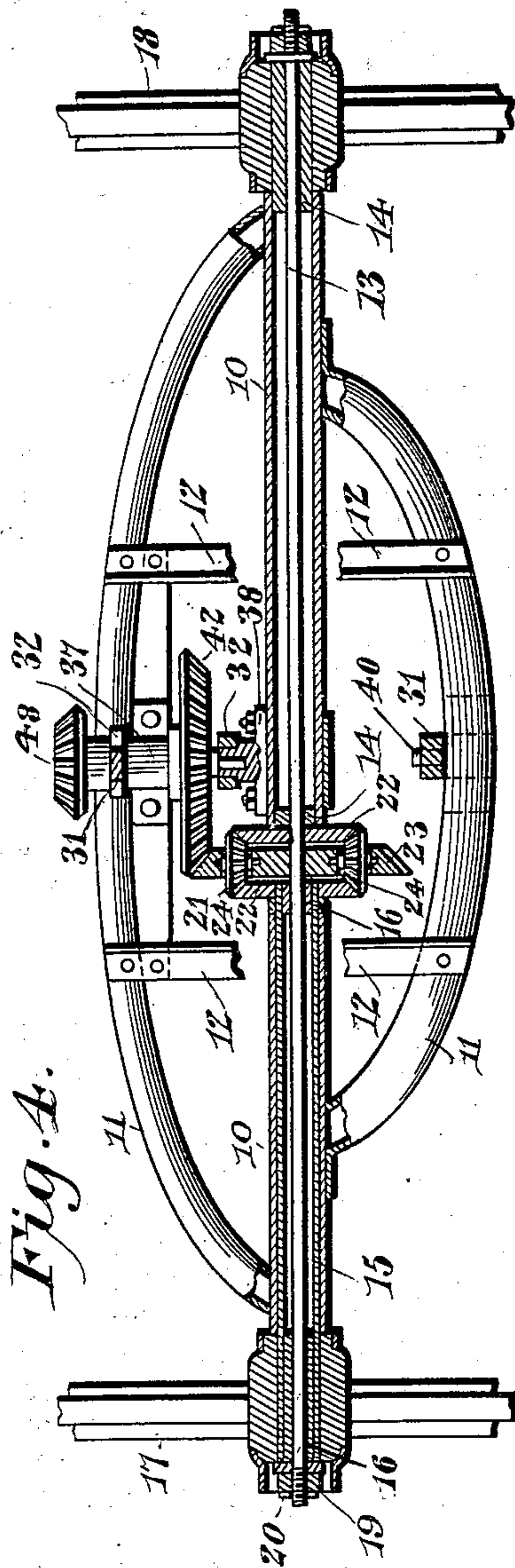
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2 Sheets—Sheet 2.



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# UNITED STATES PATENT OFFICE.

GEORGE WILLIAM SMITH, OF HARDIN, MISSOURI.

## MOTOR-VEHICLE.

SPECIFICATION forming part of Letters Patent No. 698,753, dated April 29, 1902.

Application filed August 28, 1901. Serial No. 73,583. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE WILLIAM SMITH, a citizen of the United States, residing at Hardin, in the county of Ray and State of Missouri, have invented a new and useful Motor-Vehicle, of which the following is a specification.

The present invention relates to motor-vehicles and particularly to the means for transmitting power from the motor to the wheels.

One of the objects of the invention is to provide novel mechanism for transmitting power to all of the wheels, whereby all are employed as "drivers," and to so connect them that all may be run at different speeds, and each will accommodate itself to the different relations it may assume with respect to the others, but will always be positively driven.

Other features relate to improved means for supporting the driving mechanism, so that the proper steering and control of the vehicle will not be interfered with, and to the novel construction and supports for the axles.

In the accompanying drawings the preferred embodiment of the invention is fully shown, and the construction and operation thereof are described in the following specification. It is to be understood, however, that the invention is not to be limited to the particular form set forth; but such changes and modifications may be made therefrom as fall within the scope of the appended claims.

In the drawings, Figure 1 is a perspective view of the frame of the improved motor-vehicle. Fig. 2 is a rear elevation of the same. Fig. 3 is a vertical longitudinal sectional view. Fig. 4 is a vertical sectional view through one of the axle-frames.

Similar numerals of reference designate corresponding parts in all the figures of the drawings.

In carrying out the present invention a pair of axle-frames are provided, connected by a reach which is rigidly secured at one end to one, the other frame being pivotally attached to the other end. In order to distinguish between these two frames, the rear one, to which the reach is rigidly secured, will be hereinafter termed the "stationary" frame, while the other will be described as the "movable" or "pivoted" frame. As both are similarly constructed, but one will be described.

A pair of alined casing-sections 10, having their inner ends spaced apart, are connected on their upper and under sides by truss-braces 11, suitable vertical webs 12 connecting these truss-braces and being secured to the casing-sections which are located between them. An axle-shaft 13 extends entirely through the alined sections and projects beyond the outer ends of the same, one of said sections being provided at its ends with bushings 14, that form journal-bearings for the shaft. A sleeve 15 is rotatably mounted upon the shaft and is located in the other casing-section with its ends projecting beyond both ends of the same. This sleeve is provided at its ends with bushings 16, which form journal-boxes for the shaft. Secured to the outer projecting end of the sleeve is a wheel 17, and a similar wheel 18 is fastened to the oppositely-projecting end of the shaft. The sleeve 15 and wheel 17, carried thereby, are held against longitudinal movement upon the shaft by means of a nut 19 and key 20, that is secured to the end of the shaft which projects beyond the sleeve, as clearly shown in Fig. 4. The inner projecting end of the sleeve is connected to the intermediate portion of the shaft by means of compensating gearing, (designated as a whole by the reference-numeral 21.) While this may be of any desired construction, in the form shown it comprises a pair of vertical bevel gear-wheels 22, secured, respectively, to the inner end of the sleeve and the shaft, with an intermediate master-gear 23, that is loosely mounted upon the shaft and carries pinions 24, meshing with the vertical wheels 22. By this means it will be seen that when motion is imparted to the intermediate master-wheel 23 the shaft and sleeve will be rotated simultaneously, though each may be moved at a different speed, if necessary.

Connecting the two axle-frames, as above described, is the reach, (designated as a whole by the numeral 25,) which reach consists of a plurality of tubes or bars 26, rigidly attached to the upper truss-brace and the alined casing-sections of the rear frame by means of clips 27 or other suitable devices. These tubes or reach-bars are arranged in convergent relation toward their free ends and are secured together by means of a journal-box



28, located between the same. This free end of the reach carries a depending bracket 29, comprising an upright standard 30, having a plurality of forwardly-projecting arms 31, the outer terminals of which have alined eyes 32. Rearwardly-projecting braces 33 also extend from the upright standard 30 and are connected to a horizontal sleeve 34, located between the reach-bars and having its rear end swiveled in a journal-box 35<sup>a</sup>, which is fastened to a transverse support 35, said support being attached by means of clips 36 to the lower reach-bars. The front end of the sleeve is swiveled in the journal-box 28, and thus the bracket has a vertical swinging movement with the sleeve as a pivot-axis.

The front frame is pivoted to the bracket 29 in the following manner: A journal-box 37 is secured to the upper truss-brace, and a seat 38 is attached to one of the casing-sections directly beneath the same. A bushing 39 is located in the upper box, and the eye or upper arm 31 surrounds the same, while the shank of the seat 39 is located in the eye of the intermediate arm. A pintle 40 is secured to the lower truss-brace in alinement with the boxing 37 and the seat 38 and passes through the terminal eye of the lower arm 31. By this means three bearings are provided which afford a stable pivot-axis having a plurality of bearings. Journaled in the bushing 39 and the seat or step-bearing 38 is a vertical stub-shaft 41, that carries contiguous to its lower end a horizontal bevel-wheel 42, that meshes with the master-wheel 23 of the axle. It will therefore be seen that this stub-shaft is directly in the axis of the pivot axle-frame, and will therefore always be in operative position, no matter in what direction the axle-frame may be turned.

Arranged longitudinally upon the reach is the main driving-shaft 43, which shaft passes through the sleeve 34, said sleeve being preferably provided at its opposite ends with journal-bushings 43<sup>a</sup>, and also through a bearing 44, secured to a transverse brace 45, located contiguous to the rear end of the reach. The rear end of this shaft is journaled in a step-bearing 46, fastened upon the rear frame, and the forward end is provided with a vertical bevel-gear 47, that meshes with a similar gear 48, located upon the upper end of the stop-shaft 41. The rear end of the driving-shaft 43 carries compensating gearing 49, which consists of the usual spaced wheels 50, one of which is secured to the shaft, while the other is loosely mounted thereon. The master-wheel, located between the same, is in the form of a spur-wheel 51, carrying the pinions 52, that mesh with the wheels 50. This wheel 51 is the main driving-wheel for the mechanism, and a motor or engine of any desired construction may be attached thereto, as will be readily understood by those skilled in the art. Secured directly to the loose wheel 50 is a bevel-gear 52<sup>a</sup>, which meshes with the master-wheel 23 of the rear axle.

In order to avoid confusion, all unnecessary parts, such as the motor and vehicle-body, have been omitted; but the action will be readily understood. When motion is imparted to the main driving-wheel 51, the shaft 43 will be rotated, and as a result all four wheels of the vehicle will be positively rotated through the several connections, as above described. By interposing the compensating gearing between the front and rear axles these sets of wheels may be run at different speeds, and because of the compensating gearing connecting the sections of each shaft the wheels of each set may rotate at different speeds, so that each wheel is entirely independent of the other, and the vehicle will thus accommodate itself to the various conditions met with in traveling, such as turning corners and the like.

The advantages for the construction will be obvious. By applying power to all the wheels much larger ones may be employed, so that the invention is capable of use on rough and sandy or muddy roads. The distribution of the power is greatly extended, and the strain and wear on the several parts thereby lessened. A further important feature resides in the pivotal or swiveled mounting of the bracket upon the reach, as it permits the front axle-frames to swing in a vertical direction, thus permitting of the front and rear axle-frames assuming an angular relation to each other when the wheels of one or the other pass over an obstacle or drop into a rut without twisting or straining the frame or any part thereof. It has been found by actual experience that the vehicle may be easily guided or steered, for the reason that while the front wheels are used as drivers the power imparted thereto is in line with the pivot-axis of the front frame and does not interfere with the free turning movement. The specific construction of the several parts is important, for the reason that a strong and rigid structure is provided, not easily deranged, and particularly intended for rough usage.

From the foregoing it is thought that the construction, operation, and many advantages of the herein-described invention will be apparent to those skilled in the art without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a motor-vehicle, the combination with a stationary axle-frame, of a reach secured thereto, a movable axle-frame having a pivotal connection with the reach, a sectional axle-shaft mounted on each frame, said sections being connected by compensating gearing, and a driving-shaft mounted longitudi-



nally of the reach and geared at its opposite ends to the axle-shafts.

2. In a motor-vehicle, the combination with a stationary axle-frame, of a reach secured thereto, a movable axle-frame having a pivotal connection with the reach, a sectional axle-shaft mounted on each frame, the sections of said shafts being connected by compensating gearing, and a sectional driving-shaft mounted longitudinally of the reach and geared at its opposite ends to the axle-shafts, the sections of said driving-shaft being connected by compensating gearing.

3. In a motor-vehicle, the combination with a stationary axle-frame, of a reach secured thereto, a bracket fastened to the free end of the reach, a movable axle-frame having a pivotal connection with the bracket, an axle-shaft mounted on each frame, and a driving-shaft mounted longitudinally of the reach and having gear connections with the axle-shafts.

4. In a motor-vehicle, the combination with a stationary axle-frame, of a reach secured thereto; a bracket fastened to the free end of the reach and depending below the same, a movable axle-frame having a pivotal connection with the bracket, an upright stub-shaft journaled to the bracket and geared to the axle-shaft of the movable frame, and a driving-shaft having a geared connection with the stub-shaft.

5. In a motor-vehicle, the combination with a stationary axle-frame, of a reach secured thereto, a bracket fastened to the free end of the reach and having projecting arms, an axle-frame pivoted to the arms, an axle-shaft journaled upon the pivoted frame and comprising sections connected by compensating gearing, an upright stub-shaft journaled upon the arms of the bracket and carrying a gear-wheel that meshes with the compensating gearing, and a driving-shaft having a gear connection with the stub-shaft.

6. In a motor-vehicle, the combination with an axle-frame, of a reach comprising bars secured to the frame, said bars being arranged in convergent relation toward their free ends, a journal-box connecting the convergent ends of the bars, a driving-shaft journaled in said box, an axle-frame pivoted to the free end of the reach, an axle journaled in the frame, and gear connections between the driving-shaft and the axle.

7. In a motor-vehicle, the combination with an axle-frame, of an axle-shaft journaled on the frame, a reach comprising bars secured to the frame and arranged in convergent relation toward their free ends, a journal-box connecting the convergent ends of the bars, a driving-shaft journaled in said box and geared to the axle-shaft, an axle-frame pivoted to the free end of the reach, an axle journaled in the frame, and gear connections between the driving-shaft and the axle, said connections being concentric with the pivot-axis of the frame.

8. In a motor-vehicle, the combination with an axle-frame, of an axle-shaft journaled on the frame, a reach comprising spaced bars secured to the frame, a journal-box connecting the free ends of the bars, a bracket secured to the axle-box, an axle-frame pivoted to the bracket, an axle-shaft journaled on the pivoted frame, a driving-shaft mounted in the journal-box of the reach, and geared connections between the driving-shaft and the axle-shafts of both frames.

9. In a motor-vehicle, the combination with a pair of axle-frames, of a reach connecting the frames, axles journaled upon the frames, a driving-shaft journaled upon the reach, compensating gearing located upon the driving-shaft, one of the gears thereof being secured to the shaft, the other being loosely mounted on said shaft, a master-wheel also loosely mounted on the driving-shaft and carrying pinions meshing with the secured and loose wheels, said master-wheel having teeth on its periphery, and a gear-wheel fastened to the loosely-mounted gear and having an operative connection with one of the axles.

10. In a motor-vehicle, the combination with an axle-frame comprising alined casing-sections connected by a truss-brace, of an axle-shaft journaled in the alined casing-sections, a sleeve rotatably mounted on the axle-shaft and located in one of the casing-sections, wheels secured to the sleeves and shaft, and compensating gearing connecting the sleeve and shaft.

11. In a motor-vehicle, the combination with an axle-frame comprising alined sections, spaced apart and connected by a truss-brace, of an axle-shaft rotatably mounted in the alined casing-sections, a sleeve journaled upon the axle-shaft, said sleeve being located in one of the casing-sections and projecting beyond both ends thereof, a wheel secured to the outer projecting end of the sleeve, compensating gearing connecting the inner projecting end of the sleeve and the shaft, and a wheel secured to the outer end of said shaft.

12. In a vehicle, a front axle-frame, a rear axle-frame, a reach rigidly secured to the rear axle-frame, a bracket swiveled upon the reach, the front axle being pivoted to the bracket.

13. In a vehicle, a front and rear axle, a reach secured to one axle-frame and a bracket having journals located in angular relation, one of said journals being swiveled upon the reach, the other axle-frame being pivoted in the other journal.

14. In a motor-vehicle, the combination with a reach, of a driving-shaft journaled longitudinally thereon, an axle-frame having a swiveled connection with the reach to permit of its upright swinging movement, an axle journaled upon the frame, and connections between the axle and the driving-shaft.

15. In a motor-vehicle, the combination with a reach, of a driving-shaft journaled longitudinally thereon, a bracket swiveled upon



the reach, an axle-frame pivoted to the bracket, an axle journaled upon the frame, and a stub-shaft mounted on the bracket and connecting the driving-shaft and axle.

5 16. In a motor-vehicle, the combination with a reach having spaced journal-boxes, of a bracket having journals swiveled in the boxes, a driving-shaft passing through the journals of the bracket, an axle-frame piv-  
10 oted upon the bracket, an axle journaled on

the frame, and a stub-shaft rotatably mounted on the bracket and connecting the axle and driving-shaft.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in 15 the presence of two witnesses.

GEORGE WILLIAM SMITH.

Witnesses:

JOHN MCGREGOR,

JAMES M. PUGH.