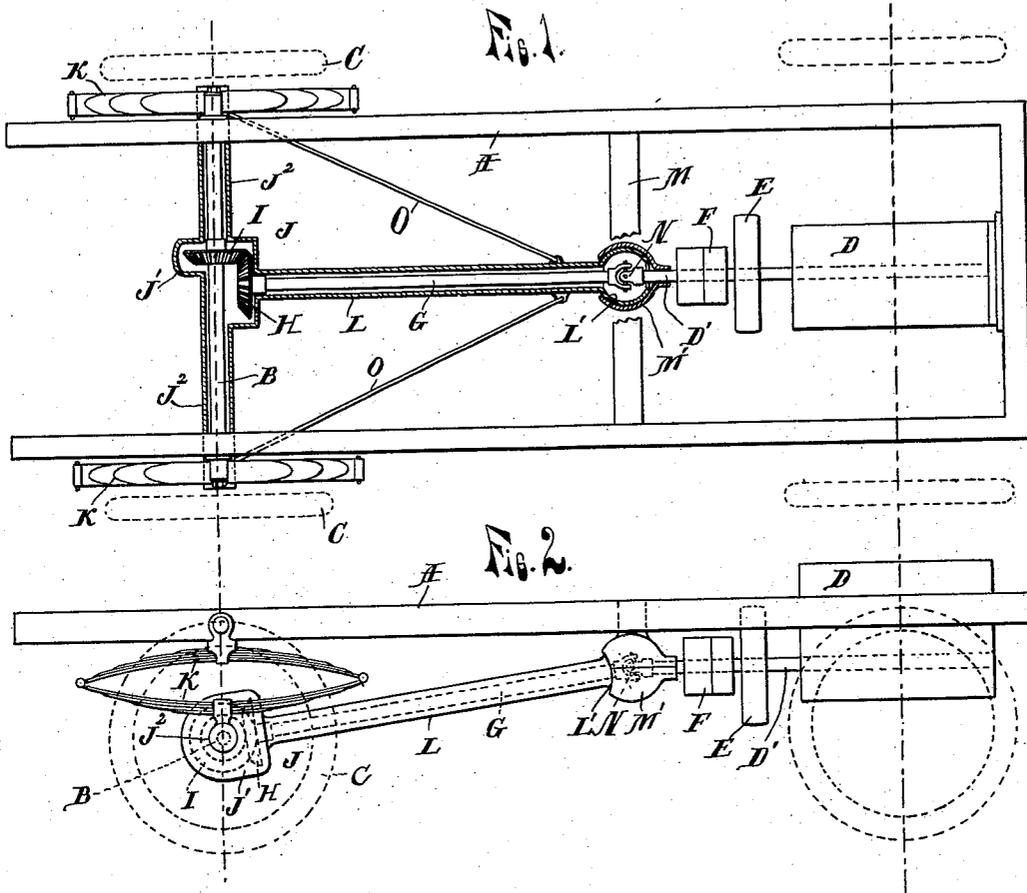


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PATENTED DEC. 22, 1903.

H. FORD.  
MOTOR VEHICLE.  
APPLICATION FILED FEB. 24, 1903.

NO MODEL.



WITNESSES.

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# UNITED STATES PATENT OFFICE.

HENRY FORD, OF DETROIT, MICHIGAN.

## MOTOR-VEHICLE.

SPECIFICATION forming part of Letters Patent No. 747,909, dated December 22, 1903.

Application filed February 24, 1903. Serial No. 144,577. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY FORD, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Motor-Vehicles, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in motor-vehicles and in the running-gear therefor, and has for its object to make a flexible running-gear in a simple, cheap, and efficient manner, which will accommodate itself to the inequalities of the road.

To this end the invention consists in the novel construction, arrangement, and combination of parts, all as more fully hereinafter described, and shown in the accompanying drawings, in which—

Figure 1 is a plan view, partly in section, of a motor-vehicle embodying my invention; Fig. 2, a side elevation thereof.

In carrying out my invention it may be applied to either the front or rear axle, and, as shown in the accompanying drawings, I have shown it as applied to the rear axle of a motor-vehicle, in which A is the frame; B, the rear axle; C, the drive-wheels; D, the motor; D', the motor-shaft; E, the fly-wheel; F, the clutch, and G the intermediate drive or power-transmitting shaft connecting the motor-shaft with the rear axle through the medium of bevel-gears H I, mounted on said shaft and rear axle, respectively.

J is a casing provided with an enlargement J', inclosing the drive-gears, and with lateral extensions J<sup>2</sup>, inclosing the rear axle, and a forwardly-extending reach portion L, preferably formed integral therewith, provided with a circular enlargement L' at its forward end, said reach portion being preferably made hollow to inclose the power-transmitting shaft coextensive therewith.

K represents springs interposed between the frame and casing.

M is a transverse frame member located at the point of connection of the reach with the frame and provided with a circular enlargement or socket M', preferably made in halves, as shown, and adapted to receive the circular

enlargement L' on the reach to form a universal or ball-and-socket connection.

N is a universal joint or coupling connecting the adjacent ends of the motor and power-transmitting shafts within said ball-and-socket connection at a point coincident therewith, so that both the reach portion or casing and power-transmitting shaft are free to rock upon the same common center in following up the inequalities of the road no matter what the deflections of the springs, said casing at the same time forming a convenient housing for the drive mechanism, which may be provided with suitable bearings.

O represents diagonal brace-rods connecting the forward end of the reach with the outer ends of the lateral extensions. These rods may be omitted, if desired, or formed integral with the casing.

While I have shown but one way of carrying out my invention, I wish it understood that I am aware that my invention may be carried out in various ways, all of which I deem within the spirit of my invention.

Having thus fully described my invention, what I claim is—

1. In a motor-vehicle running-gear, the combination with the frame and motor thereon, of a rear axle having a casing formed with a rigid reach portion extending forwardly to a point of connection with the frame and forming a universal connection therewith and a power-transmitting shaft coincidentally connected at said point by a universal joint with the motor-shaft and extending rearwardly therefrom to the rear axle in bearings supported by said casing.

2. In a motor-vehicle running-gear, the combination with the spring-supported frame and motor thereon, of a rear axle having an inclosing casing formed with a rigid reach portion extending forwardly to a point of connection with the frame in the longitudinal center thereof and forming a universal connection therewith and a power-transmitting shaft coincidentally connected at said point by a universal joint with the motor-shaft and extending rearwardly therefrom to the rear axle in bearings supported by the reach portion of said casing.

3. In a motor-vehicle running-gear, the combination with the spring-supported frame

and motor thereon, of a rear axle having an inclosing casing formed with a rigid reach portion extending forwardly in the longitudinal center of the frame to a point of connection therewith formed with a universal connection and a power-transmitting shaft coincidently connected at said point by a universal joint with the motor-shaft, said shaft inclosed within said reach portion of said casing and revolving in bearings therein.

4. In a motor-vehicle running-gear, the combination with the spring-supported frame and motor thereon, of a rear axle having an inclosing casing formed with a rigid reach portion extending forwardly to a point of connection with the frame and forming a universal connection therewith, and a power-transmitting shaft inclosed within said reach portion and supported in bearings therein, said power-transmitting shaft connected with the motor-shaft by a universal joint coincident with the universal connection of the reach portion with the frame.

5. In a motor-vehicle running-gear, the combination with the frame and motor supported thereon of a rear axle having a casing provided with a hollow reach portion extending forwardly to a point of connection with the frame, and a power-transmitting shaft, inclosed within and revolving in bearings in said reach portion, said reach portion and power-transmitting shaft having coincident points of connection, one with the frame by a ball-and-socket connection and the other with the motor-shaft by a universal-joint connection.

6. In a motor-vehicle, the combination with the frame the motor thereon and a power-transmitting shaft connecting the rear axle with the shaft of the motor longitudinally of the frame, of the rear axle having a casing formed with a forwardly-extending hollow reach portion in which the power-transmitting shaft revolves, said reach portion and power-transmitting shaft having coincident universal connections one with the frame and the other with the motor-shaft.

7. In a motor-vehicle running-gear, the combination with the vehicle-frame, the motor thereon, and an intermediate drive-shaft connection between the motor and rear axle, of a rear-axle casing integrally formed with a rigid hollow reach portion extending forwardly in the center of the frame and forming a casing in which the intermediate drive-shaft is journaled in suitable bearings, said reach portion having its forward end connected to the frame to form a direct and positive draft connection independently of the motor, by a ball-and-socket connection the socket member of which is rigidly connected to the frame at a point between the rear axle and motor.

8. In a motor-vehicle running-gear, the combination with the vehicle-frame, the motor thereon, and an intermediate drive-shaft connection between the motor and rear axle,

of a rear-axle casing integrally formed with a rigid hollow reach portion extending forwardly in the center of the frame and forming a casing in which the drive-shaft is journaled in suitable bearings, said reach portion at its forward end terminating in a hollow ball member within which the connection is made between the drive-shaft and the power-transmitting shaft and a socket member rigidly connected to the frame independently of the motor and forming with the ball member a positive and direct draft connection with the frame.

9. In a motor-vehicle running-gear, the combination with the frame, of a motor thereon having a drive-shaft arranged longitudinally of the frame, a driven shaft from which motion is transmitted to the rear axle, and a casing having a reach portion in line with and inclosing the driven shaft and provided with bearings therefor and with lateral extensions at the rear end of said reach portion inclosing the rear axle and provided with bearings therefor, the reach portion of said casing provided with a ball-and-socket connection with the frame at its forward end and a universal-joint connection between said drive and driven shafts within the ball-and-socket connection and coincident therewith.

10. In a motor-vehicle running-gear, the combination with the frame the motor and rear axle, of a casing inclosing the rear axle and having a reach portion extending to a point of connection with the frame and a power-transmitting shaft coextensive with said reach portion and revolving in bearings within the same, said shaft having a universal connection with the motor-shaft.

11. In a motor-vehicle running-gear, the combination with the frame and rear axle, of a casing inclosing the rear axle and having a reach portion extending to the point of connection with the frame forming a universal connection therewith, the motor supported upon the frame forward of said connection and having a shaft extending lengthwise of the frame to said point of connection and a power-transmitting shaft extending from said connection to the rear axle the connection between the two shafts being formed by a universal joint.

12. In a motor-vehicle running-gear, the combination with the frame, the motor and axle, of a reach portion extending from the axle to a point of connection with the frame and having a universal connection therewith and driving mechanism having a universal connection with the motor at a point coincident with that of the frame and reach.

13. In a motor-vehicle running-gear, the combination with the frame, the motor and axle, of a tubular reach portion extending from the axle to a point of connection with the frame, formed by a ball-and-socket joint, a driven shaft within said reach portion coextensive therewith and having a universal con-

nection with the motor-shaft within the ball-and-socket joint and coincident therewith.

14. In a motor-vehicle, the combination with the frame, the motor thereon and axle, of a casing having a hollow reach portion connected to the frame by a ball-and-socket joint at a point between the motor and axle and which forms the sole strut and draft connection between the frame and axle.

15. In a motor-vehicle, the combination with the frame, the motor and axle, of a casing having a reach portion connected to the frame by a ball-and-socket connection, the socket member of which is rigidly connected to the frame at a point between the motor and axle and which reach portion forms the direct and positive draft connection between the frame and axle.

16. In a motor-vehicle, the combination with the frame the motor, drive-shaft and rear axle, of a casing having a hollow reach portion forming a housing for the drive-shaft and so arranged that it forms the sole distance-bar between a motor rigidly supported by the frame and the rear axle, the connection between the frame and reach being formed by a universal joint at a point between the axle and motor.

17. In a motor-vehicle running-gear, the

combination with the frame the motor thereon and an intermediate drive connection between the motor-shaft and the rear axle through which motion is transmitted to the rear axle, of a casing inclosing said rear axle and integrally formed with a hollow reach portion extending centrally forward to a fixed point of connection with the frame intermediate between the axle and motor and inclosing said intermediate drive connection said point of connection formed by a ball-and-socket joint, the socket portion of which is rigidly secured to the frame and forms a bearing for the motor-shaft.

18. A gear-casing for the actuating mechanism of motor-vehicles comprising a casing having a reach portion forming the direct and only positive draft connection between the rear axle and frame and an intervening universal connection, the connection between the frame and reach being formed by a ball-and-socket joint one member of which is rigidly secured to the frame.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY FORD.

Witnesses:

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LEWIS E. FLANDERS.