J. L. MORRIS.

DIFFERENTIAL DRIVING GEARING FOR AUTOMOBILES.

APPLICATION FILED JULY 18, 1910.

998,628. Patented July 25, 1911.

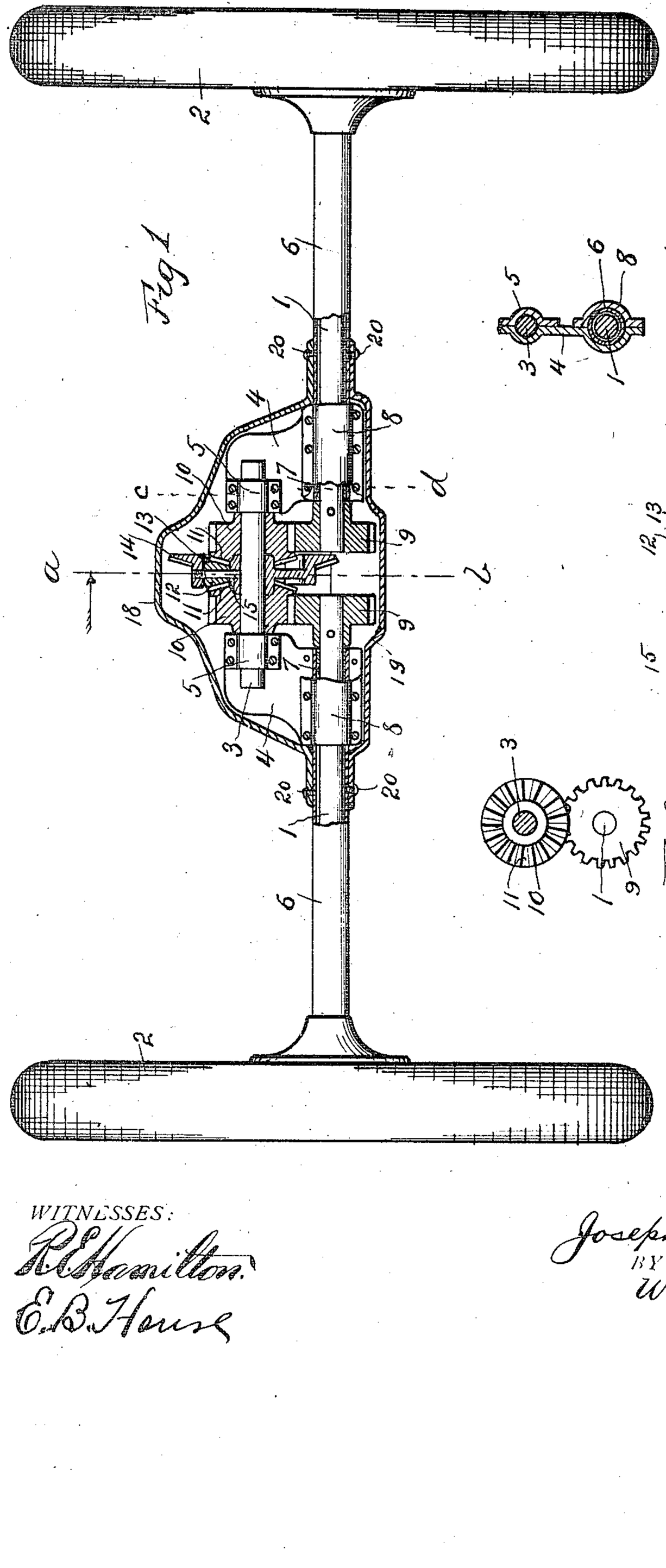

Fig 1

Fig 4

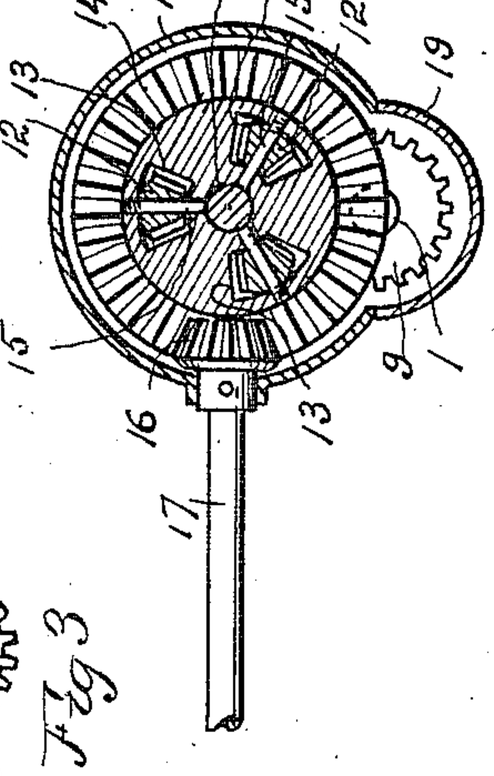

Fig 2

Fig 3

WITNESSES:

R. E. Hamilton.

E. B. House

INVENTOR.

Joseph L. Morris

BY

Warren D. House

His ATTORNEY.

UNITED STATES PATENT OFFICE.

JOSEPH L. MORRIS, OF LAMAR, COLORADO.

DIFFERENTIAL DRIVING-GEARING FOR AUTOMOBILES.

998,628. Specification of Letters Patent. Patented July 25, 1911.

Application filed July 18, 1910. Serial No. 572,488.

To all whom it may concern:

Be it known that I, JOSEPH L. MORRIS, a citizen of the United States, residing at Lamar, in the county of Prowers and State of Colorado, have invented certain new and useful Improvements in Differential Driving-Gearing for Automobiles, of which the following is a specification.

My invention relates to improvements in differential driving gearing for automobiles.

One object of my invention is to provide a structure which shall afford a relatively large amount of clearance between the axle rotating mechanism and the ground.

Another object of my invention is to provide in an automobile structure, employing two rotary axles disposed in axial alinement with each other, a frame work for supporting the axles and the differential gearing employed to drive the same which shall be exceedingly strong and compact.

A further object of my invention is to provide a differential driving gear structure, that receives its motive power from the automobile engine at a point of elevation horizontally in line with the crank-shaft of the engine, thereby eliminating the loss of power that is occasioned by the use of a shaft that is out of line with the engine crank-shaft.

Other features of my invention are hereinafter described and claimed.

In the accompanying drawings which illustrate the preferred form of my invention, Figure 1 is a view partly in rear elevation, partly in vertical section, and partly broken away, showing my improved construction. Fig. 2 is a vertical sectional view on the dotted line *a*—*b* of Fig. 1. Fig. 3 is a vertical section on the dotted line *a*—*b* of Fig. 1, the intermediate driving gear wheel being removed. Fig. 4 is a vertical section on the dotted line *c*—*d* of Fig. 1.

Similar reference characters denote similar parts.

1 denotes the usual horizontal rotary driving axles disposed in axial alinement with each other and having respectively secured thereto the carrying wheels 2, of the type commonly employed in automobiles.

For supporting the inner ends of the axles 1 I provide the following described mechanism:—Above the axles 1 and parallel therewith is a cylindrical bar 3 which extends horizontally through a vertical plane which separates the axles 1 and is disposed transversely at right angles thereto. Bearings for rigidly supporting the bar 3 are provided and preferably comprise each a block 4 having two horizontal semi-cylindrical recesses disposed one above the other. In the upper ones of said cylindrical recesses of the blocks 4 are tightly fitted respectively the ends of the bar 3. In the lower recesses of the blocks 4 are rotatively mounted respectively the axles 1. Clamping plates 5 are respectively secured to the blocks 4 and embrace and tightly hold the bar 3 in the recesses in which it is fitted. Mounted in the lower recesses of the blocks 4 are two horizontal tubes 6 through which extend the axles 1 respectively. Boxings 7 are mounted in the tubes 6 and respectively rotatively support the axles 1. Clamping plates 8 embrace respectively the tubes 6 and are respectively secured to the blocks 4.

Rigidly secured to the axles 1 respectively are two spur gear wheels 9 which respectively mesh with two gear wheels 10 which are rotatable on the bar 3 intermediate of the blocks 4. The gear wheels 10 are provided on their adjacent sides with bevel gear teeth 11 which mesh with the teeth of one or more bevel pinions 12 located intermediate of the gear wheels 10 and in holes 13 provided in the web of a rotary member, comprising preferably a bevel driving gear wheel 14 the hub of which is rotatively mounted on the bar 3 intermediate of the gear wheels 10. Secured radially in the wheel 14 are pins 15 which respectively extend across the holes 13 and respectively support the pinions 12. Meshing with the bevel driving gear wheel 14 is a bevel pinion 16 secured to a driving shaft 17, which is preferably disposed horizontally and in the same plane as and at right angles to the bar 3. The driving shaft 17 is rotated by any suitable means, not shown, and connected with the engine, not shown.

An inclosing casing comprising any suitable construction may be employed to house the gearing hereinbefore described. In the drawings I have shown the casing as comprising two shells 18 and 19 disposed respectively above and below the tubes 6 to which they may be secured in any desired manner, as by the screws 20, shown in Fig. 1.

In the operation of my invention, when the driving shaft 17 is rotated, rotation will be transmitted to the axles 1 through the intermediacy of the pinion 16, driving gear

wheel 14, pinions 12, gear wheels 10 and gear wheels 9.

As is well understood, the pinions 12 carried by the gear wheel 14 and meshing with the gear wheels 10 permit the wheels 2 to turn curves without slipping.

By locating the bar 3 which carries the gear 14 above the axles 1 a large amount of clearance between the running parts of the gearing and the ground is obtainable, much more so than is obtainable with constructions in which the support for the large gear wheel 14 is disposed at the same plane as the axles. By employing a solid bar 3 supported rigidly in the blocks 4, a very strong and compact construction is afforded.

By disposing the driving shaft 17 in the same horizontal plane as the bar 3, and in alinement with the crank shaft of the engine, a greater saving of power is effected, owing to the perfect alinement of the driving shaft with the engine crank-shaft, than is obtained in the ordinary automobile structure in which the driving shaft does not aline with the crank shaft.

Usually the engine is disposed so high on the machine relative to the support for the large differential gear wheel 14 that the driving shaft connecting the engine and pinion 16 must be disposed obliquely, thus occasioning the employment of knuckle joints or flexible connections. By disposing the bar 3 vertically above the axles 1, the shaft 17 may be horizontally disposed in most instances.

I do not limit my invention to the particular structure shown and described, as various modifications may be made, within the scope of the appended claims, without departing from the spirit of my invention.

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

1. In differential driving gearing for automobiles, two rotary axles disposed in axial alinement, a bar above and extending parallel with said axles through a plane transversely separating said axles, two members rigidly secured to and supporting said bar at opposite sides respectively of said plane, means encircling said axles for supporting said members, two gear wheels rotatable on said bar, means for transmitting rotation from said gear wheels respectively to said axles, a rotary driving member on said bar, and a pinion rotatively mounted on said member and meshing with said gear wheels.

2. In differential driving gearing for automobiles, two rotary axles disposed in axial alinement, a bar above and parallel with said axles and extending transversely through a plane separating said axles, two tubes encircling said axles, two members supported respectively by said tubes and rigidly secured to and supporting said bar, two gear wheels rotatable on said bar, means for transmitting rotation from said gear wheels respectively to said axles, a rotary driving member on said bar, and a pinion rotatively mounted on said member and meshing with said gear wheels.

3. In differential driving gearing for automobiles, two rotary axles disposed in axial alinement, a bar above and parallel with said axles and extending transversely through a plane separating said axles, two members rigidly secured to and supporting said bar at opposite sides respectively of said plane, means encircling said axles respectively for supporting said members, two gear wheels rotatable on said bar, means for transmitting rotation from said gear wheels respectively to said axles, a rotary driving member on said bar, a pinion rotatively mounted on said member and meshing with said gear wheels, a rotary driving shaft located at right angles to and in the same plane as said bar, and means for transmitting rotation from said shaft to said member.

4. In differential driving gearing for automobiles, two rotary axles in axial alinement with each other, a bar above and parallel with said axles and extending transversely through a plane separating said axles, two members rigidly secured to and supporting said bar at opposite sides respectively of said plane, means encircling said axles for supporting said members, two gear wheels rotatable on said bar, means for transmitting rotation from said gear wheels respectively to said axles, a driving gear wheel rotatable on said bar intermediate of said gear wheels, a pinion meshing with said two gear wheels and rotatively mounted on said driving gear wheel with its axis disposed radially relative to said driving gear wheel, a driving shaft located at right angles to and in the same plane as said bar, and a pinion secured to said shaft and meshing with said driving gear wheel.

5. In differential driving gearing for automobiles, two horizontal rotary axles disposed in axial alinement with each other, a horizontal bar disposed parallel with and above said axles and extending through a plane separating said axles, two members rotatively supporting said axles and secured rigidly to said bar, two gear wheels rotatable on said bar, means for transmitting rotation from said gear wheels respectively to said axles, a rotary driving member on said bar, and a pinion meshing with said gear wheels and rotatable on said member.

6. In differential driving gearing for automobiles, two rotary horizontal axles disposed in axial alinement with each other, a horizontal bar disposed parallel with and above said axles and extending through a plane separating said axles, two members

rotatively supporting said axles and secured rigidly to said bar, two gear wheels rotatable on said bar, means for transmitting rotation from said gear wheels respectively to said axles, a rotary driving member on said bar, a pinion meshing with said two gear wheels and rotatable on said member, a horizontal driving shaft located at right angles to said bar and in the same plane therewith, and means for transmitting rotation from said driving shaft to said member.

7. In differential driving gearing for automobiles, two rotary axles disposed in axial alinement with each other, a bar disposed above and parallel with said axles and extending through a plane separating said axles, two members rotatively supporting said axles and secured rigidly to said bar, two gear wheels rotatable on said bar, a rotary member on said bar intermediate of said two gear wheels, a pinion meshing with said gear wheels and having its axis disposed radially relative to said member and carried by said member, and two gear wheels secured respectively to said axles and meshing respectively with said two gear wheels.

8. In differential driving gearing for automobiles, two rotary axles disposed in axial alinement with each other, a bar disposed above and parallel with the said axles, two members rotatively supporting said axles and secured rigidly to said bar, a rotary driving member mounted on said bar, and differential driving mechanism connecting said member with said axles.

9. In differential driving gearing for automobiles, two rotary axles disposed in axial alinement with each other, a bar disposed above and parallel with said axles, two members rotatively supporting said axles and secured rigidly to said bar, a rotary driving member mounted on said bar, differential driving mechanism connecting said member and said axles, a driving shaft disposed at right angles to and in the same plane as said bar, and means for transmitting rotation from said shaft to said rotary member.

10. In differential gearing for automobiles, a frame comprising two members having means for respectively supporting a pair of rotary axles, and a bar secured rigidly to said members for supporting axle driving mechanism.

11. In differential gearing for automobiles, a frame comprising two castings having means for supporting a pair of rotary axles, and a cylindrical bar having its ends secured rigidly to said castings for supporting axle driving mechanism.

12. In differential gearing for automobiles, two members, two axles rotatively mounted on said members, and a connecting bar rigidly secured to said members for supporting axle driving mechanism between said members.

13. In differential gearing for automobiles, two members, two axles rotatively mounted on said members respectively, and a connecting bar rigidly secured to said members and disposed above said axles for supporting axle driving mechanism between said members.

14. In differential gearing for automobiles, a U shaped frame the arms of which comprise two members having means for respectively supporting two rotary axles, and the portion of the frame which connects the two arms of the frame comprising a bar rigidly secured at its ends to said arm members for supporting axle driving mechanism between said arms.

In testimony whereof I have signed my name to this specification in presence of two subscribing witnesses.

JOSEPH L. MORRIS.

Witnesses:

CHARLES E. JOHNSON,

S. W. NOLAND.