Jan. 13, 1925.

1,522,819

A. HEBERT

FOUR-WHEEL DRIVE

Filed June 5, 1924

3 Sheets-Sheet 1

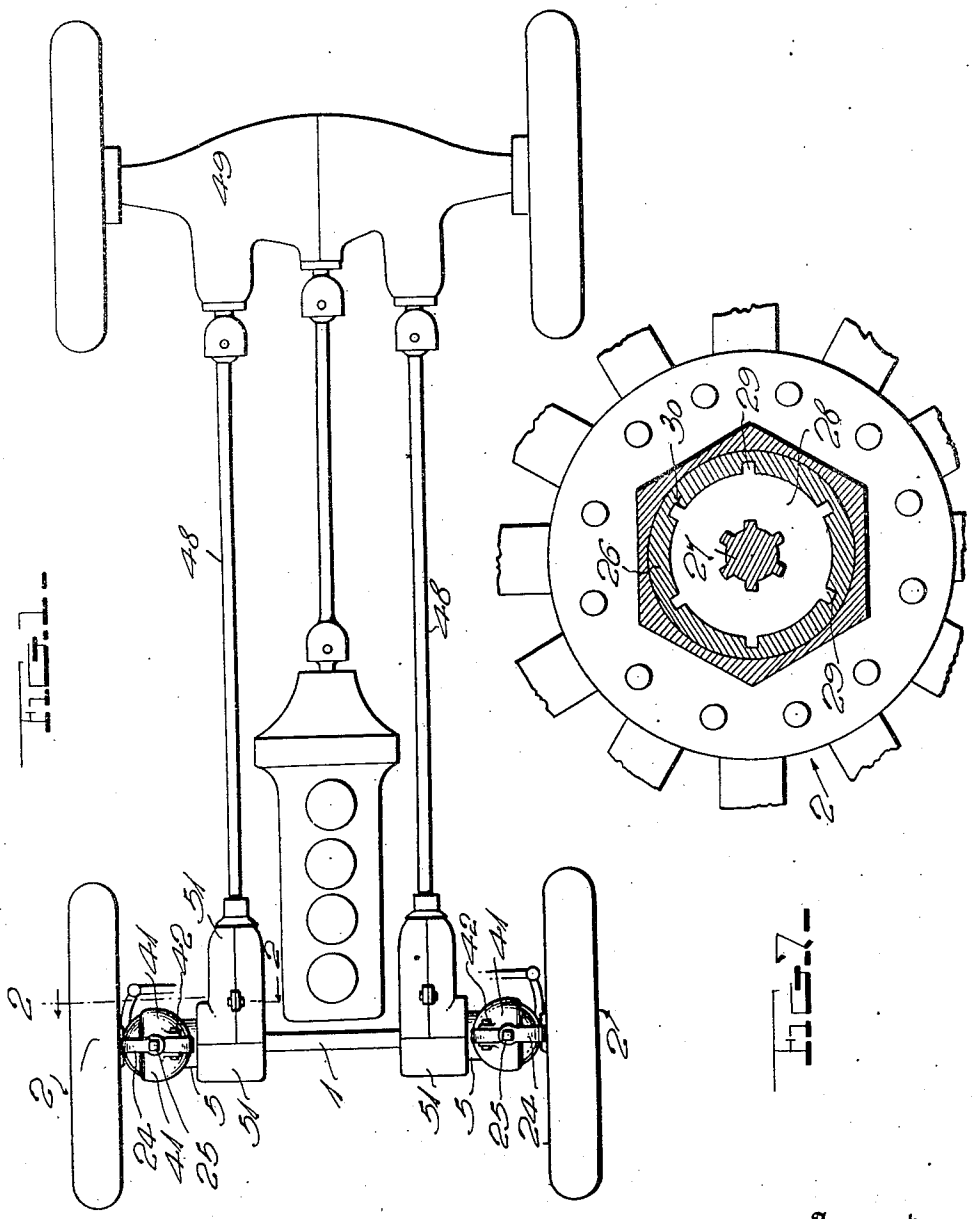


Fig. 1.

Fig. 2.

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FOUR-WHEEL DRIVE

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FIG. 2.

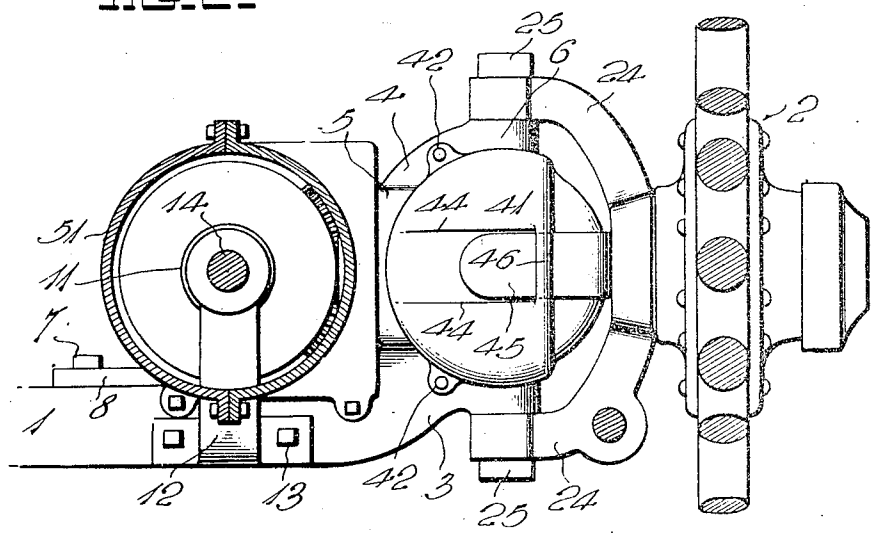


FIG. 3.

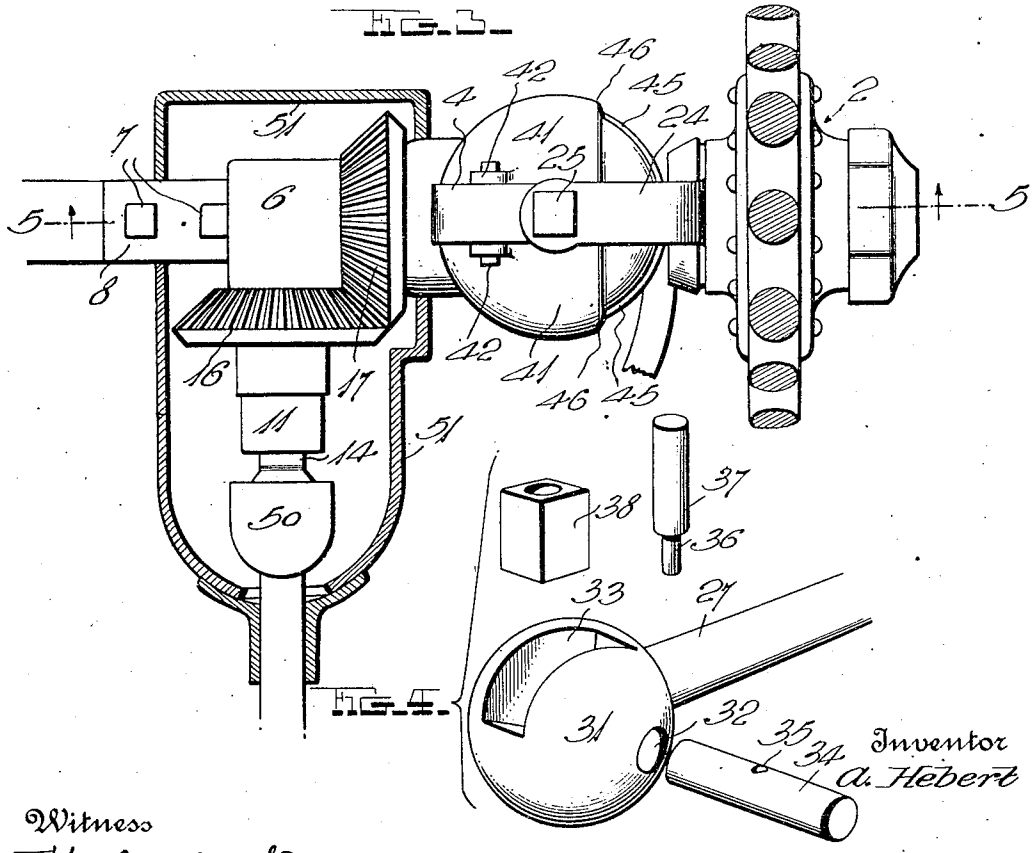


FIG. 4.

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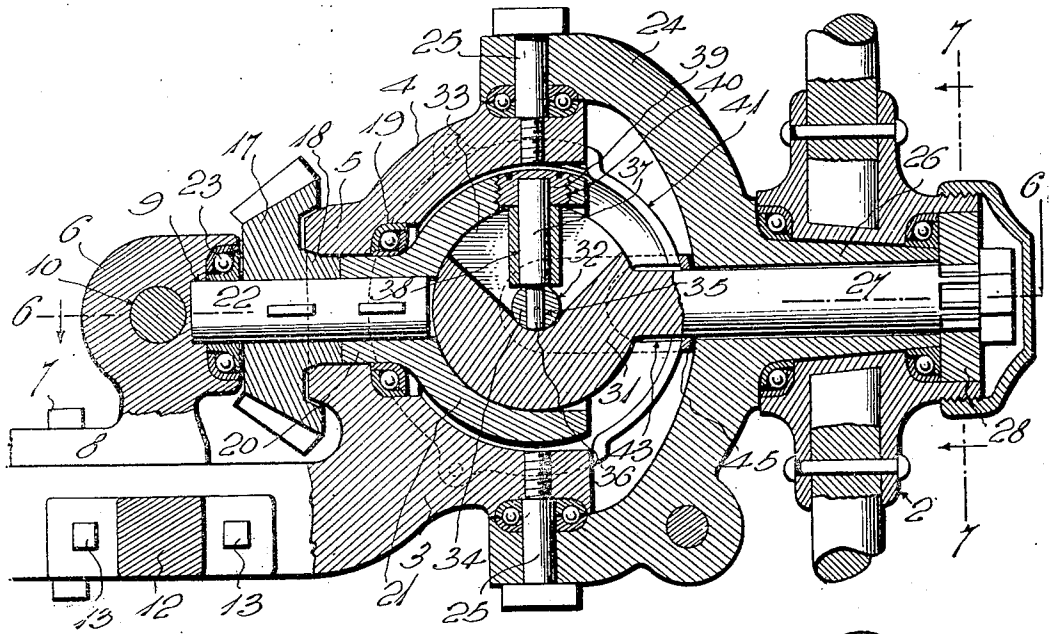
Jan. 13, 1925. 1,522,819

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FOUR-WHEEL DRIVE

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FIG. 5



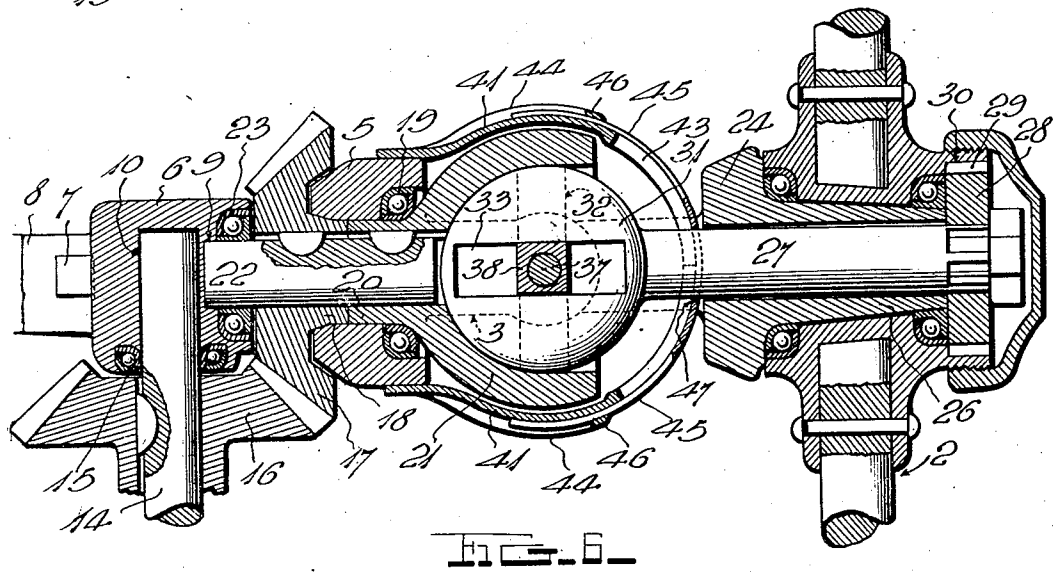


FIG. 6

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UNITED STATES PATENT OFFICE.

ALEXANDRE HEBERT, OF MONTPELIER, VERMONT.

FOUR-WHEEL DRIVE.

Application filed June 5, 1924. Serial No. 718,132.

To all whom it may concern:

Be it known that I, ALEXANDRE HEBERT, a citizen of the United States, residing at Montpelier, in the county of Washington and State of Vermont, have invented certain new and useful Improvements in Four-Wheel Drives; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in mechanisms whereby the front as well as the rear wheels of motor vehicles, may be driven, with the well known advantageous results, and the invention relates primarily to simple, inexpensive and compact means for driving the front wheels without interfering with proper steering.

A further object of the invention is to provide a housing for a universal joint forming one of the wheel driving connections, with a slot through which the adjacent wheel driving shaft or spindle passes, and to provide novel means for normally closing this slot, so as to prevent the escape of grease therethrough and to prevent the entrance of dust and grit.

A further aim of the invention is to provide the front axle with a novel association of bearings for certain driven parts associated therewith.

Still another aim is to provide an improved type of universal joint which will operate very smoothly and efficiently.

With the foregoing in view, the invention resides in the novel subject matter hereinafter described and claimed, the description being supplemented by the accompanying drawings.

Figure 1 is a top plan view of the major portion of an automobile chassis, embodying my invention.

Figure 2 is a vertical transverse sectional view as indicated by line 2—2 of Fig. 1, on an enlarged scale.

Figure 3 is a plan view partly in section, of the parts shown in Fig. 2.

Figure 4 is a perspective view showing certain parts of the universal joint.

Figure 5 is a vertical sectional view taken substantially on line 5—5 of Fig. 3.

Figure 6 is a horizontal sectional view as indicated by line 6—6 of Fig. 5.

Figure 7 is a detail vertical section on line 7—7 of Fig. 5.

In the drawings above briefly described, which illustrate the preferred form of my invention, the numeral 1 designates a front axle, at the ends of which front wheels 2 are disposed. Novel provision is made at each end of the axle for driving the wheels 2, and as the construction at one end is a duplicate of that at the other, the structure at only one end is shown and described in detail. The axle 1 is provided with a forked end having a lower arm 3 and an upper arm 4, the latter extending first upwardly and then outwardly, as shown most clearly in Figs. 4 and 5. Near its juncture with the axle 1, the upwardly extending portion of the fork arm 4 is enlarged as at 5 and provided with an opening, to provide a horizontal bearing whose axis extends longitudinally of the axle.

The upper side of the axle 1 is provided with a bearing lug 6 which is spaced inwardly from the bearing 5 and may well be secured to the axle by one or more bolts or the like 7, passing for instance through a foot 8 with which said lug is provided. This lug is formed with a horizontal bearing 9 in alinement with the bearing 5 and is provided also with another horizontal bearing 10 at right angles to the axis of said bearings 5 and 9. Another bearing 11 is disposed behind the lug 6 and is secured to the axle in any suitable manner. In the present showing, this bearing is carried by the upper end of an arm 12 which projects rearwardly and upwardly from the axle and is secured to the latter by bolts or the like 13.

A short longitudinal drive shaft 14 is rotatably mounted in the bearings 10 and 11, each of which is preferably equipped with bearing balls or rollers 15, said shaft having a beveled gear 16 between said bearings. This gear meshes with another beveled gear 17 between the bearings 5 and 9, the last named gear having a hub 18 which is rotatably received in one end of said bearing 5. Similarly received in the other end of the last named bearing, which end is preferably provided with bearing balls 19, is a hub 20 of a universal joint socket 21 which is disposed between the fork arms 3 and 4. A second short shaft 22 passes through the hubs 18 and 20 and is keyed to both of them, said shaft passing into the bearing 19, which bearing is by preference equipped with bearing rollers or balls 23.

A wheel-carrying fork 24 has its ends pivoted at 25, to the fork arms 3 and 4, said fork 24 being provided with a tubular spindle 26 upon which the wheel 2 is rotatably mounted. Passing rotatably through this spindle, is a wheel-driving shaft 27 whose outer end is connected with the wheel, for instance by means of a driving plate 28 having peripheral teeth 29 received in the recesses 30 in the wheel hub. The inner end of the shaft 27 is provided with a ball 31 which is received in the pocket 21. This ball is provided with an axial bore 32 at right angles to the axis of the shaft 27, and is formed also with a recess 33 from said bore to its periphery, said recess being of the segmental form shown in Fig. 5 and being provided with opposed flat parallel walls. A pivot pin 34 is received in the bore 32 and is formed with a central opening 35 receiving the reduced end 36 of a second pivot pin 37 which is at right angles to the first named pin. A flat-sided bearing bushing 38 surrounds the pin 37 and engages the flat walls of the recess 33, and to hold said bushing and the pin 37 in place, I prefer to use a cap 39 threaded into an opening 40 in the socket 21, said cap snugly receiving the outer end of the pin 37.

It will be seen that the parts 21, 31, 34, 37, 38, etc., constitute a simple, yet an effective universal joint connecting the shafts 22 and 27, to drive the latter from the former regardless of the angle which may exist between them when steering. The action of the joint is very smooth and it does not interfere with steering in any manner whatsoever.

A globular housing is provided for the universal joint above described. This housing preferably consists of two duplicate halves 41 which may be secured against opposite sides of the fork arms 3 and 4, by bolts or the like 42. The two sections 41 abut each other between the universal joint and the wheel 2 and they are jointly formed with a slot 43 through which the shaft 27 passes. Above and below this slot, the sections 41 are thickened on their outer sides to provide a pair of parallel guides 44, one of which is spaced upwardly from the upper edge of the slot, while the other is similarly spaced downwardly from the lower edge of said slot. A one-piece spring 45 extends over the slot 43 to exclude foreign matter and to prevent the leakage of grease therethrough, and the ends of this spring are slidably received between the upper and lower guides 44. To retain the spring 45 in proper position between the guides 44 and prevent outward bowing thereof away from the universal joint housing, I prefer to provide vertical bridge straps 46 which are integral with the housing sections and extend across the outer side of said spring. This spring is formed with a central opening 47 through which the shaft 27 passes and it will be seen that as this shaft is swung forwardly or rearwardly, during steering of the machine, the spring will slide upon the housing, at all times sealing the slot 43.

It will be seen from Fig. 1 that a pair of longitudinal shafts 48 extend from a back axle 49, said shafts being driven in any desired manner from the movable parts within the axle housing. The front ends of the shafts 48 are connected by universal joints 50, with the two shafts 14, one of said joints being shown in Fig. 3. Sectional casings 51 preferably cover the joints 50, the shafts 14, the bearings 11, lugs 6, and beveled gears 16—17, and these casings may of course contain suitable lubricant.

By providing the novel construction herein described and illustrated, a four wheel drive may be provided which is simple and compact, yet is very efficient and in every way desirable, and as excellent results may be obtained from the details disclosed, they are preferably followed. However, within the scope of the invention as claimed, numerous minor changes may be made.

I claim:—

1. In a front wheel drive, an axle having an integral fork at its end whose upper arm extends upwardly and then outwardly and is provided in its upwardly extending portion with a horizontal bearing having its axis disposed longitudinally of the axle, a bearing lug on the axle and spaced inwardly from the fork thereof, said lug having one bearing alined with the first named bearing and another bearing at right angles thereto, an arm extending rearwardly from the axle and having a bearing alined with said other bearing of the lug, a short shaft mounted in said other bearing of said lug and said bearing of said arm and having a bevel gear between the two, a second short shaft passing through the first named bearing and extending into the first mentioned bearing of said lug, a second bevel gear on said second shaft between the bearings of the latter, a joint member on said second shaft within the aforesaid fork, a second fork whose arms are pivoted to the arms of the first named fork, said second fork having a tubular rigid spindle, a wheel mounted on said spindle, and a driving shaft for said wheel passing through the spindle, said driving shaft having a joint member connected with the aforesaid joint member to be driven thereby.

2. In a front wheel drive, an axle having an integral fork at its end whose upper arm extends upwardly and then outwardly and is provided in its upwardly extending portion with a horizontal bearing having its axis disposed longitudinally of the axle, a bearing lug on the axle and spaced inwardly

from the fork thereof, said lug having one bearing alined with the first named bearing and another bearing at right angles thereto, an arm extending rearwardly from the axle and having a bearing alined with said other bearing of the lug, a short shaft mounted in said other bearing of said lug and said bearing of said arm and having a bevel gear between the two, a second bevel gear between the lug and the first named bearing having a hub extending into one end of the latter, the two gears being in mesh, a joint member between the fork arms having a hub extending into the other end of said first named bearing, a second short shaft on which said hubs are secured, said second shaft having an end rotatably mounted in the first named bearing of said lug, a second fork whose arms are pivoted to the arms of the first named fork, said second fork having a tubular rigid spindle, a wheel mounted on said spindle, and a driving shaft for said wheel passing through the spindle, said driving shaft having a joint member connected with the aforesaid joint member to be driven thereby.

3. In a front wheel drive, the combination with a forked axle, a driven universal joint between the fork arms, a wheel-carrying fork whose arms are pivoted to the arms of the axle fork, and a driving shaft for the wheel extending from said joint through said wheel-carrying fork; of a globular housing around said joint formed of two halves secured against the front and rear sides of the axle fork respectively, said housing having a horizontal slot through which said wheel driving shaft projects and being outwardly thickened in outwardly spaced relation with the edges of the slot to provide parallel guides, and a curved spring extending over said slot and slidably received between said guides, said spring having an opening through which said wheel-driving shaft passes.

4. A structure as specified in claim 3: together with a pair of bridge straps extending transversely across the outer side of said spring and having their ends connected to said thickened portions of the housing to retain the spring in place between the guides.

5. A universal joint comprising a shaft-carried socket having a threaded radial opening, a shaft-carried ball within said socket having an axial bore at right angles to the shaft axis, and a flat-sided segmental recess from said bore to its periphery, a pin passing rotatably through said bore and having a central opening, a second pin at right angles to the first named pin and having a reduced end received in the opening thereof, said second pin passing through said recess into the central portion of said threaded opening, a flat-sided bushing around said second pin engaging the flat sides of said recess, and a cap threaded into said threaded opening and engaging said second pin to hold the same in place.

In testimony whereof I have hereunto affixed my signature.

ALEXANDRE HEBERT.