No. 650,837. Patented June 5, 1900.

H. E. HEATH.

BALANCE GEARING FOR AUTOMOBILES.

(Application filed Jan. 2, 1900.)

(No Model.) 2 Sheets—Sheet 1.

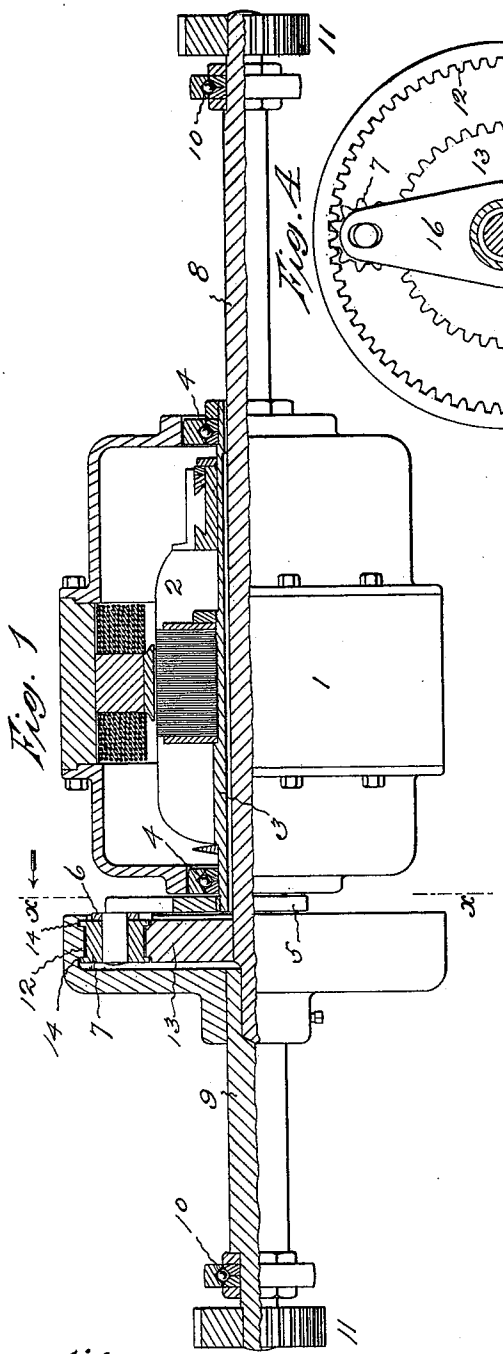


Fig. 1

Fig. 4

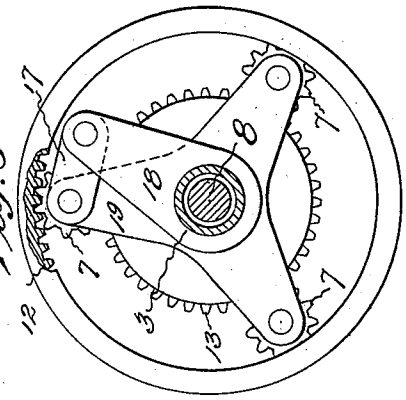


Fig. 5

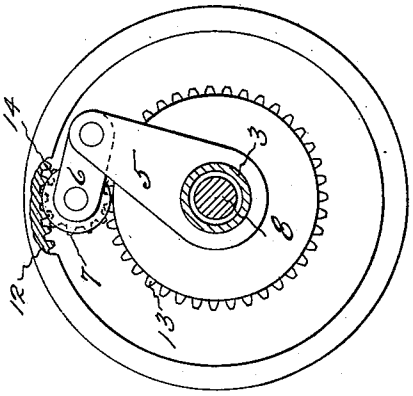


Fig. 2

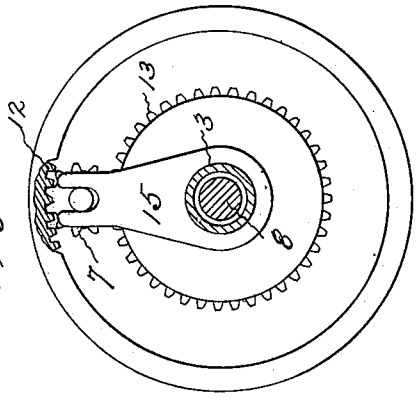


Fig. 3

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Fig. 6

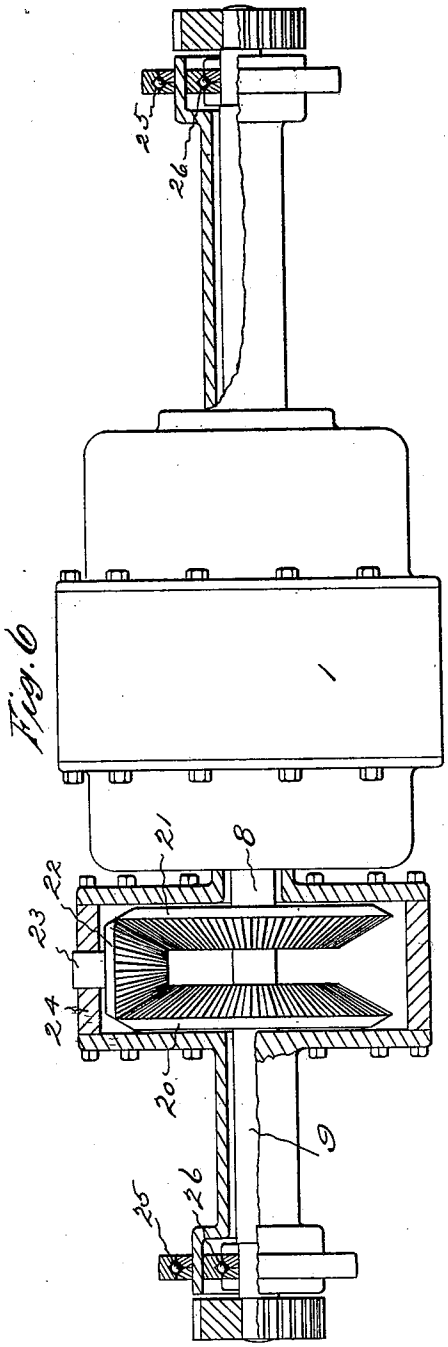


Fig. 7

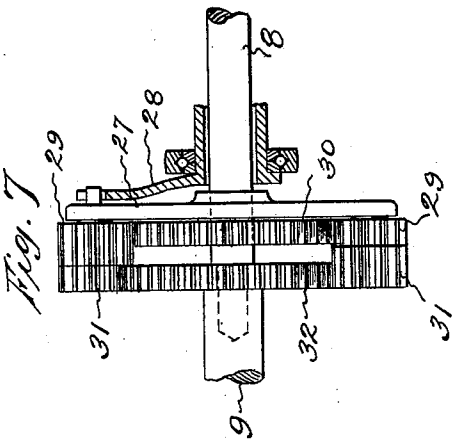
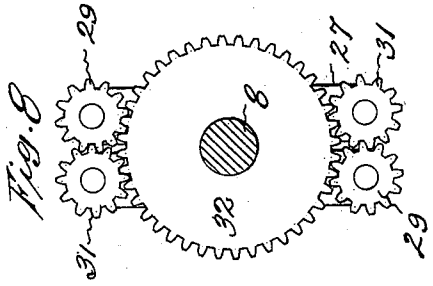


Fig. 8



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UNITED STATES PATENT OFFICE.

HARRY E. HEATH, OF WINDSOR, CONNECTICUT, ASSIGNOR TO THE EDDY ELECTRIC MANUFACTURING COMPANY, OF SAME PLACE.

BALANCE-GEARING FOR AUTOMOBILES.

SPECIFICATION forming part of Letters Patent No. 650,837, dated June 5, 1900.

Application filed January 2, 1900. Serial No. 43. (No model.)

To all whom it may concern:

Be it known that I, HARRY E. HEATH, a citizen of the United States, residing at Windsor, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Balance-Gearing for Automobiles, of which the following is a specification.

This invention relates to those driving mechanisms which are so arranged that while both wheels are driven from a single motor-shaft one wheel may rotate faster than the other when the vehicle is turned.

The object of the invention is to so arrange and support the gears that the motor-bearings and the gear-bearings are not required to be in absolute alinement, thereby simplifying the construction and allowing a reduction in the weight of the parts and increasing the ease of adjustment.

The invention may be utilized with an internal and external spur-gear or with two bevel-gears or with two external spur or two internal spur gears, the main feature being that the support for the driving-pinion is loosely held by a part extending from the motor-shaft in order that the pinion may assume and remain in proper mesh with the gears without binding, regardless of any minor variations in the alinement of the motor-bearings and the gear-bearings due to wear, to springing of the parts, or to hasty adjustment.

Referring to the accompanying drawings, Figure 1 shows a view, part being in side elevation and part in central section, of the driving mechanism of an electric automobile having balance-gearing arranged according to my invention. Fig. 2 is a transverse section on the plane indicated by the dotted line *x x* of Fig. 1. Fig. 3 is a transverse sectional view illustrating a modified manner of connecting the motor-shaft arm and the driving-pinion support. Fig. 4 is a detail view illustrating another modification of the same. Fig. 5 is a sectional view illustrating the manner of driving the gears with three pinions connected with the motor-shaft according to my invention. Fig. 6 is a view illustrating the invention in connection with bevel-gears. Fig. 7 is a side view illustrating the invention with two external spur-gears, and Fig. 8 is a transverse section showing the arrangement with the external spur-gears.

The motor may be of any common design, and the field-frame 1 can be hung from the vehicle in any ordinary manner. The armature 2 is built upon a tubular shaft 3, that is supported by antifriction-bearings 4 at the ends of the field-frame.

In the form of the invention illustrated in Figs. 1 and 2 an arm 5 is fastened to one end of the armature-shaft, and attached to the end of this arm is a link 6. The driving-pinion 7 is mounted upon a stud projecting from the end of this link. The gear-shaft is formed in two sections, the inner end of the section 8 extending into a socket in the inner end of the section 9. Near the outer ends of the sections the gear-shaft is supported by antifriction-bearings 10, and outside of the bearings the shaft is provided with gears 11. An internal spur-gear 12 is mounted upon the section 9, and an external spur-gear 13 is mounted upon the section 8, of the shaft. The driving-pinion at the end of the link lies between and meshes with these gears. The revolution of the arm through the link revolves the pinion; but the link allows the pinion to freely adjust itself between the gears. It is preferred to form a flange 14 upon each side of the driving-pinion in order that the teeth may be held from working into the teeth of either of the other gears and becoming jammed.

In the form of invention illustrated in Fig. 3 the arm 15 is forked and the arbor of the driving-pinion is held by the walls of the fork, so that while carried around by the arm the pinion is free to adjust itself between the internal and external spur-gears independently of the adjustment of the arm and shaft which bears the arm.

In the form illustrated in Fig. 4 the arm 16 is slotted and the arbor of the driving-pinion held by the walls of the slot, so that it may move longitudinally of the arm.

In Fig. 5 the link 17 connects the arm 18, fastened to the armature-shaft with a yoke 19, that is loosely mounted upon the gear-

shaft and that is provided with three driving-pinions. In this instance the pinions are held fixed with relation to each other by the yoke, but the yoke is free to assume such positions that the gears will run free without regard to the adjustment of the armature-shaft and arm projecting therefrom, which is connected by the link with the yoke.

The bevel-gear 20, in the form shown in Fig. 6, is secured to one section of the gear-shaft, and the bevel-gear 21 is secured to the other section of the gear-shaft. The bevel-pinion 22, that meshes with the bevel-gears 20 and 21, attached to the different sections of the gear-shaft, has an arbor 23, that extends through bearings in the frame 24. The bearings for the bevel-pinion arbor are made sufficiently loose to allow the pinion to accommodate itself freely to the gears regardless of the adjustment of the frame. The frame 24 is attached to the motor-shaft, which is supported by the antifriction-bearings 25. The gear-shaft is supported by antifriction-bearings 26. In this form the gear-shaft is adjustable independently of the armature-shaft and the pinion accommodates itself without regard to the adjustment of either.

In Fig. 7 the yoke 27, that is driven by the arm 28, is loosely mounted upon one section of the gear-shaft and supports two pinions 29, that mesh with the spur-gear 30, and also two pinions 31, that mesh with the spur-gear 32. Of course one spur-gear is mounted upon one section of the gear-shaft and the other spur-gear is mounted upon the other section of the gear-shaft, and the pinions which are adjacent and which mesh with different gears mesh with each other, as illustrated in Fig. 8. The arm 28 is loosely connected with the yoke 27, so that there will be no binding of the pinions should there be a change in the adjustment of the armature-shaft, to which the arm is connected.

In all of the instances shown the driving-pinions are held by supports that are loosely connected with the driving part that extends from the shaft that is driven by the motor. With either of these constructions the gear-shaft is adjusted upon its bearings and the motor-driving shaft is adjusted upon its bearings, each without regard to the other.

By the employment of my simple improvement it is not necessary to adjust the bearings of both the motor-shaft and the gearing-shaft so that the axes of these parts will be in and always remain in exact line. For this reason great care is not necessarily exercised in adjusting the bearings, and complicated constructions are avoided. Not only are time and labor economized in assembling the parts when connected according to my invention, but the parts may be designed smaller in size and lighter in weight, for a little spring or yielding will practically be no detriment. Furthermore, it is unnecessary to employ skilled assistance should the bearings work loose or become worn, so as to slightly change the relative positions of the motor-shaft and gear-shaft.

I claim as my invention—

1. In an automobile driving mechanism in combination, a tubular shaft rotated by the motor, antifriction-bearings supporting the tubular shaft, a divided shaft, antifriction-bearings supporting the divided shaft, a gear mounted upon each section of the divided shaft, a pinion meshing with the gears, and an adjustable connection between the tubular shaft and the pinion-support whereby the adjustment of the tubular shaft is effected without changing the position of the pinion, substantially as specified.

2. In an automobile driving mechanism in combination, a tubular shaft rotated by the motor, antifriction-bearings supporting the shaft, a divided shaft, antifriction-bearings supporting the divided shaft, a gear mounted upon each section of the divided shaft, a pinion mounted upon a freely-adjustable support, and a connection loosely holding the pinion-support and fastened to the motor-shaft, substantially as specified.

3. In an automobile driving mechanism in combination, a tubular shaft rotated by the motor, antifriction-bearings supporting the motor-shaft, a divided shaft, antifriction-bearings supporting the divided shaft, a gear mounted upon each section of the divided shaft, an arm extending outwardly from the motor-shaft, and a pinion loosely connected with the arm and meshing with the gears, substantially as specified.

4. In an automobile driving mechanism in combination, a tubular shaft rotated by the motor, antifriction-bearings supporting the motor-shaft, a divided shaft, antifriction-bearings supporting the divided shaft, a gear mounted upon each section of the divided shaft, an arm extending outwardly from the motor-shaft, a link connected with the arm, and a pinion mounted upon the link and meshing with the gears, substantially as specified.

5. In an automobile driving mechanism in combination, a tubular shaft rotated by the motor, antifriction-bearings supporting the motor-shaft, a divided shaft, antifriction-bearings supporting the divided shaft, an arm extending outwardly from the motor-shaft, a yoke supporting pinions in mesh with the gears, and a connection between the arm and the yoke, substantially as specified.

6. In an automobile driving mechanism in combination, an electric motor, a tubular shaft rotated by the armature of the motor, antifriction-bearings supporting the armature-shaft, a divided shaft, antifriction-bearings supporting the divided shaft, a gear mounted upon each section of the divided shaft, an arm projecting from the armature-shaft, a pinion meshing with the gears, and a loose connection between the arm and pinion, substantially as specified.

7. In an automobile driving mechanism in

combination, a tubular shaft rotated by the motor, a divided shaft, a gear mounted upon each section of the divided shaft, a freely-adjustable pinion meshing with the gears, and a loose connection between the pinion and the tubular shaft whereby the adjustment of the tubular shaft is effected without changing the position of the pinion, substantially as specified.

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