No. 814,502. PATENTED MAR. 6, 1906.

J. ANDERSON.

VARIABLE SPEED GEARING.

APPLICATION FILED DEC. 20, 1904.

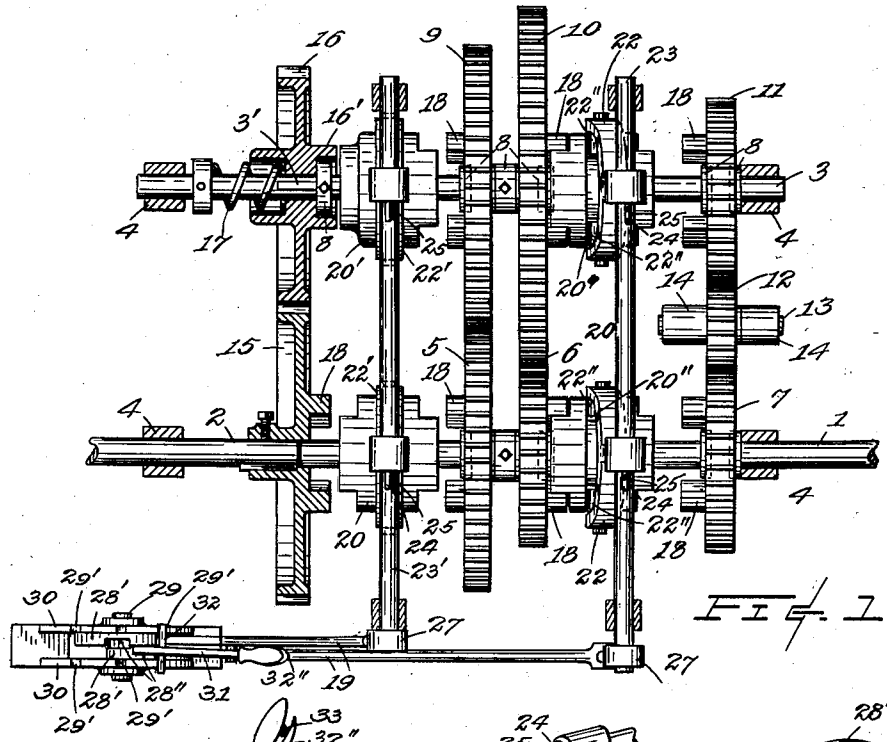


Fig. 1.

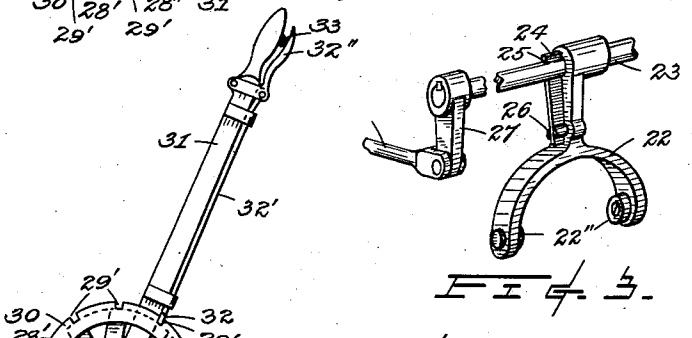


Fig. 3.

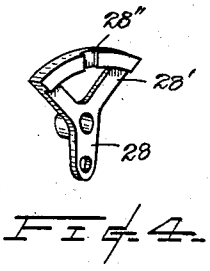


Fig. 4.

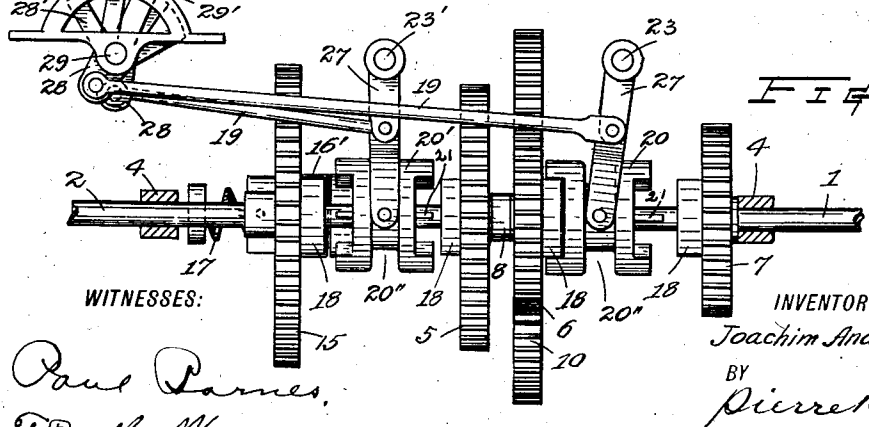


Fig. 2.

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VARIABLE-SPEED GEARING.

No. 814,502. Specification of Letters Patent. Patented March 6, 1906.

Application filed December 20, 1904. Serial No. 237,607.

To all whom it may concern:

Be it known that I, JOACHIM ANDERSON, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Variable-Speed Gearing, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to variable-speed gearing designed more particularly for use on automobiles; and the object of the invention is to provide improved apparatus of this class.

The nature and characteristics of the invention will appear from the following description, taken in connection with the accompanying drawings, wherein—

Figure 1 is a plan view, partly in section, of an embodiment of my invention. Fig. 2 is a front elevation of the same, and Figs. 3 and 4 are perspective views of details of the gear-shifting devices shown in the preceding views.

In the drawings the reference-numeral 1 denotes a power or driving shaft; 2, a driven shaft which is in axial alinement with the driving-shaft, and 3 another shaft, desirably disposed to be parallel with the other said shafts and which I shall hereinafter designate as the "intermediate" shaft. All of these shafts are seated in journal-boxes 4, formed or provided in a gear-inclosing case, as usual. Toothed gears 5, 6, and 7 are mounted upon the shaft 1 so as to be normally free to rotate thereon, but secured, as by set-collars 8, against longitudinal displacement. In like manner toothed gears 9, 10, and 11 are mounted upon the intermediate shaft 3, and the first two named gears of each shaft are continuously in mesh with the corresponding ones of the other of these shafts, and the gears, being of different diameters, will when in engagement rotate the driven ones at different speeds. Positioned intermediate of the gears 7 and 11 and in continuous mesh therewith is an idler-gear 12, provided with an axle 13, seated in journal-boxes 14 and adapted during engagement to cause the gear 11 to be rotated in an opposite direction from the aforesaid directly-driven gears. Keyed or otherwise fixedly secured to the driven shaft 2 is a gear 15, which is normally in mesh with a gear 16, which is rotatably fixed to the intermediate shaft 3, but is so connected to the latter, as by a spline 3′, as to be capable of being moved endwise against the action of a spring 17 for disengaging the same from the gear 15. Projecting outwardly from the hubs or webs of the said gears, with the exception of 12 and 16, are coupling-horns 18, which are adapted to be engaged by like horns of clutch-sleeves 20 and 20′, slidable longitudinally upon the driving and intermediate shafts and rotatably secured thereto by splines 21, as usual. The gear 16 instead of being provided with coupling-horns is provided, preferably, with an outwardly-projecting cylindrical flange 16′, and the adjacent end of the clutch-sleeve 20′ is made without coupling-horns. The said clutch-sleeves are disposed between each two intermeshing sets of gears, as shown, and are operatively connected in pairs by forked arms 22 22′ and provided with rolls 22″, projecting into annular grooves 20″ of the said sleeves. The arms 22 22′ are pivotally hung upon rocker-shafts 23 23′ and resiliently connected thereto as against rotation by springs 24, extending through apertures 25 of these rocker-shafts and to slotted studs 26 of the respective said arms. The rocker-shafts are journaled in suitable bearings and are provided with crank-arms 27, connected by reach-rods 19 with vibratory arms 28 of the controlling mechanism. This controlling mechanism comprises a transverse shaft 29, seated axially of stationary arc-plates 30, two sector-plates 28′, and an actuating-lever 31, seated upon the shaft 29 between said arc-plates. The sector-plates are each formed integral with the said vibratory arms and provided with recesses 28″, whereby they can be individually engaged with the said lever when the latter is tilted therein. The lever is provided with a transverse latch-bar 32, adapted to enter either of the notches 29′ of the arc-plates according to the position of the lever. For convenience the latch-bar is connected by a rod 32′ with a fulcrumed grab-lever 32″ at the handle end of the lever 31, and a compression-spring 33 may advantageously be positioned between the lever 32″ and said lever-handle.

The operation of the invention is as follows: When the driven shaft is to be rotated in the same direction as the driving-shaft, the power may be transmitted directly to the driven shaft by giving a partial rotation to the rocker-shaft 23′ and cause the clutch-sleeves therebeneath to couple with the gear 15 and desirably thrust the gear 16 out of mesh therewith, and in consequence the driving and driven shafts are then rotated as a single

shaft. Should, however, it be desired to impart a different speed to the driven shaft, then the latter is driven through the service of the intermediate shaft by engaging the proper pair of gears of the driving and intermediate shaft, which rotates the latter, and from thence is rotated the driven shaft through the intermeshing gears 15 and 16. The reverse motion of the driven shaft is attained by engaging the gears 7 and 11 with the clutches, the shaft 1 thus giving a corresponding rotation to the intermediate and a reverse motion to the driven shaft.

The object of the spring connections between the forked shifting arms and the rocker-shafts thereof is to insure the horns of either of the coupling-sleeves entering between the opposing ones of the gears when either the gears or sleeves in rotating are presented in registering alinement.

It should be noted that all of the gears with the exception of 15 and 16 are normally rotatively disconnected from their shafts, and in consequence the intermediate shaft is normally idle.

Changes in speed can be quickly made by simply engaging the suitable driving and driven gears with the shafts and not, as is commonly done, by shifting the several gears into and out of peripheral engagement.

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

1. In apparatus of the class described, the combination of a driving-shaft, gears loosely mounted upon said shaft, a driven shaft, a gear fixedly mounted upon said driven shaft, an intermediate shaft, gears loosely mounted upon the last-named shaft and in mesh with the said gears of the driving-shaft, another gear splined to the intermediate shaft and normally meshing with the said gear of the driven shaft, means for clutching the gears of the driving-shaft to the latter and also the corresponding gears of the intermediate shaft to their shaft, and means to clutch the driving and driven shafts directly to each other, substantially as described.

2. In an apparatus of the class described, the combination of a driving-shaft, a driven shaft, means for positively connecting and disconnecting said shafts, an intermediate shaft, gears normally loose upon said driving and intermediate shafts, and continuously meshing with each other, means for clutching said gears to their respective shafts, a gear splined to said intermediate shaft, a gear fixedly connected to said driven shaft, means for disengaging the said two last-named gears, substantially as described.

3. In apparatus of the class described, the combination of a driving-shaft, a loose gear thereon, an intermediate shaft, a loose gear mounted on said intermediate shaft and continuously in mesh with the first-named gear, means to clutch said gears coincidently to their respective shafts, a gear rotatable with said intermediate shaft, a driven shaft, a gear fixedly secured to said driven shaft and meshing with the last-named gear on the intermediate shaft, means by which the driving and driven shafts may be directly connected together and means for moving said last-named gear out of mesh with the fixed gear on the driven shaft when the driving and driven shafts are directly connected.

4. In apparatus of the class described, the combination of the shafts and the gears thereof, with coupling-sleeves slidably mounted upon said shafts, a forked arm for each of said sleeves, a rocker-shaft, said arms being loosely hung upon said rocker-shaft, and a resilient connection between said arms and the rocker-shaft, substantially as described.

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

JOACHIM ANDERSON.

Witnesses:

PIERRE BARNES,

F. DUDLEY MOSS.