No. 716,929. Patented Dec. 30, 1902.

J. M. OUGH.

VARIABLE SPEED GEAR.

(Application filed Mar. 20, 1901.)

(No Model.)

Fig. 1.

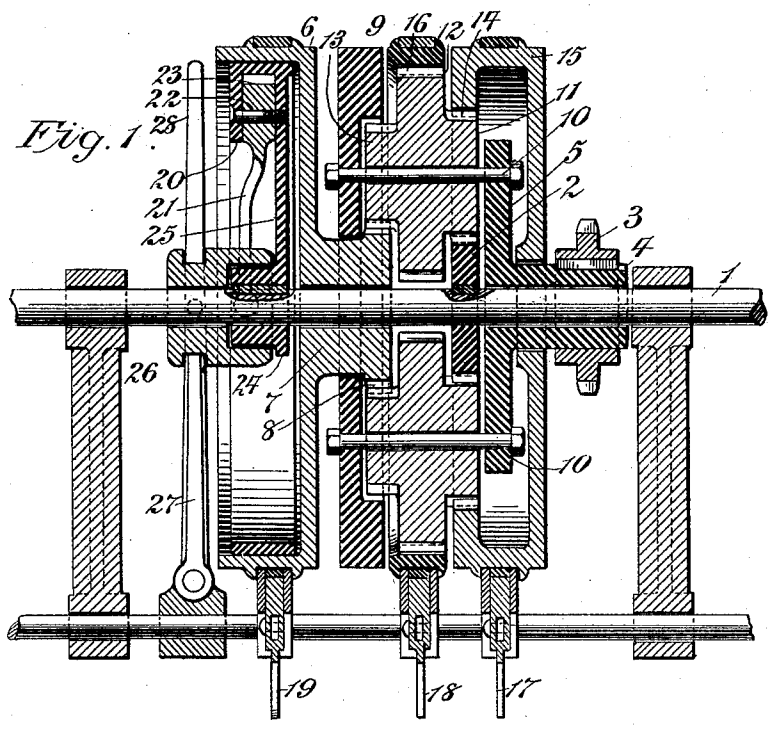
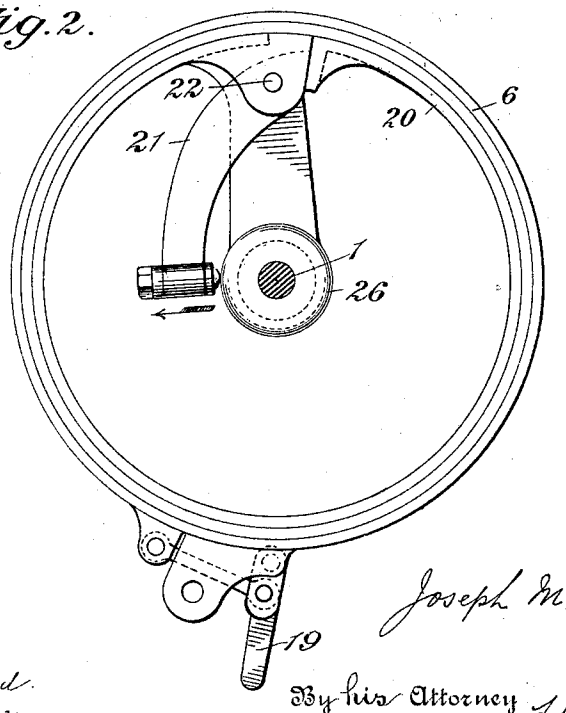


Fig. 2.



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UNITED STATES PATENT OFFICE.

JOSEPH M. OUGH, OF SAN FRANCISCO, CALIFORNIA.

VARIABLE-SPEED GEAR.

SPECIFICATION forming part of Letters Patent No. 716,929, dated December 30, 1902.

Application filed March 20, 1901. Serial No. 52,054. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH M. OUGH, a citizen of the United States, residing in the city of San Francisco, in the county of San Francisco and State of California, have invented a certain new and useful Improvement in Variable-Speed Gear, of which the following is a specification.

My present invention has relation to a novel combination of planetary gears, particularly for use on automobiles, whereby a number of successively higher forward speeds and a single backward speed may be obtained within a small compass from a driving-shaft moving with a constant velocity.

My invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a vertical longitudinal section of my gearing combination, and Fig. 2 is an end view of the same.

The driving-shaft 1, which is impelled by any desired prime mover, carries the gearing, which is impelled by the driving-pinion 2, keyed or otherwise fastened to said shaft.

In the form of my invention illustrated in the drawings the driven element is a sprocket 3, carried on the hub 4 of the disk 5, said hub and bearing-disk turning loosely upon the shaft 1. A drum 6, provided with a hub 7, also turns loosely upon said shaft, and a spur-gear 8, larger than the gear 2, is carried by said hub. Riding loosely upon said hub, between the drum and spur-gear, is a second bearing-disk 9. A number of orbital pivots 10 are carried at their extremities by said two bearing-disks, and each of said pivots carries a compound orbital gear, preferably comprising three pinions 11, 12, and 13, turning freely upon said pivots. The embodiment of my invention herein specifically illustrated shows two of such compound gears; but it is obvious that any desired number of such gears may be employed surrounding the driving-shaft 1, as shown. The pinions 11 mesh always with the driving-pinion 2 and with their surrounding internal gear 14 on the drum 15, said drum turning loosely on the sleeve or hub 4. The pinions 12, which are fast to 11, mesh always with their surrounding internal gear 16. The pinions 13, fast to 11 and 12, mesh with the spur-gear 8. The three drums 15, 16, and 6 are each surrounded and controlled by a strap-brake controlled in a well-known manner by the respective brake-levers 17, 18, and 19.

The drum 6 is provided with a deep flange, as illustrated, within which a spring clutching-rim 20 is placed. This rim tends normally to assume a form permitting the drum 6 to rotate loosely around it. One end of the rim 20 carries the lever 21, pivoted, as at 22, and so placed that its shorter end 23 tends to expand the rim and clutch the drum 20 when the longer end of said lever is moved outward from the shaft or with the arrow in Fig. 2.

The hub 24 is keyed to the shaft 1, and the rim 20 is carried on said hub by the arm 25. The tapered annular cam 26 fits over said hub 24, and when moved inward to the position shown in Figure 1 causes the end of the lever 21 to ride on its outer surface, and thus act to tightly engage the rim 24 and drum 6 by friction, forcing said drum to rotate in unison with the driving-shaft 1 through the arm 25 and rim 20.

By means of the lever 27, operated by the handle 28, the annular cam 26 is moved for tightening or loosening the rim 20 within the drum 6 at will. This can be accomplished during revolution of the gearing.

The operation of this combination of gears is as follows: On fixing the drum 15 by means of the brake-lever 17 the driving-gear 2 imparts to the pinions 11 an orbital movement within the surrounding gear 14 in the same direction as that of the driving-shaft. This is transmitted through the disk 5 and hub 4 to the sprocket-wheel 3. Thus is produced the slowest forward speed. By releasing the drum 15 and tightening the brake on the gear 16 an intermediate forward speed is secured in a similar manner. Full speed is obtained by expanding the rim 20 within the drum 6. This locks the compound gear 11 12 13 between the pinions 8 and 2 and forces the bearing-disks 5 and 9 to turn in unison with the driving-shaft 1. Reverse movement is attained by applying the strap-brake to the drum 6, and thus fixing the pinion 8. This pinion having a greater diameter than 2, the forward rotation of 2 causes pinions 11 12 13 to move orbitally in a reverse direction at a slow rate appropriate to the backing of a vehicle.

By the use of the combination of gears above described I attain three forward and one backward speeds by means contained within a small compass wherein no room is wasted.

What I claim is—

In a variable-speed gear, a driving-shaft, a driving-pinion fast thereon and a reversing-pinion turning loosely thereon; in combination with planetary gears each composed of a large gear between two small ones, said small gears meshing respectively with said driving and reversing pinions and said large gear extending into the space between the faces of said pinions, internal gears engaging with the larger planetary gear and with the planetary gearing in mesh with the driving-pinion and means for locking either of said internal gears or said reversing-gear at will.

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