

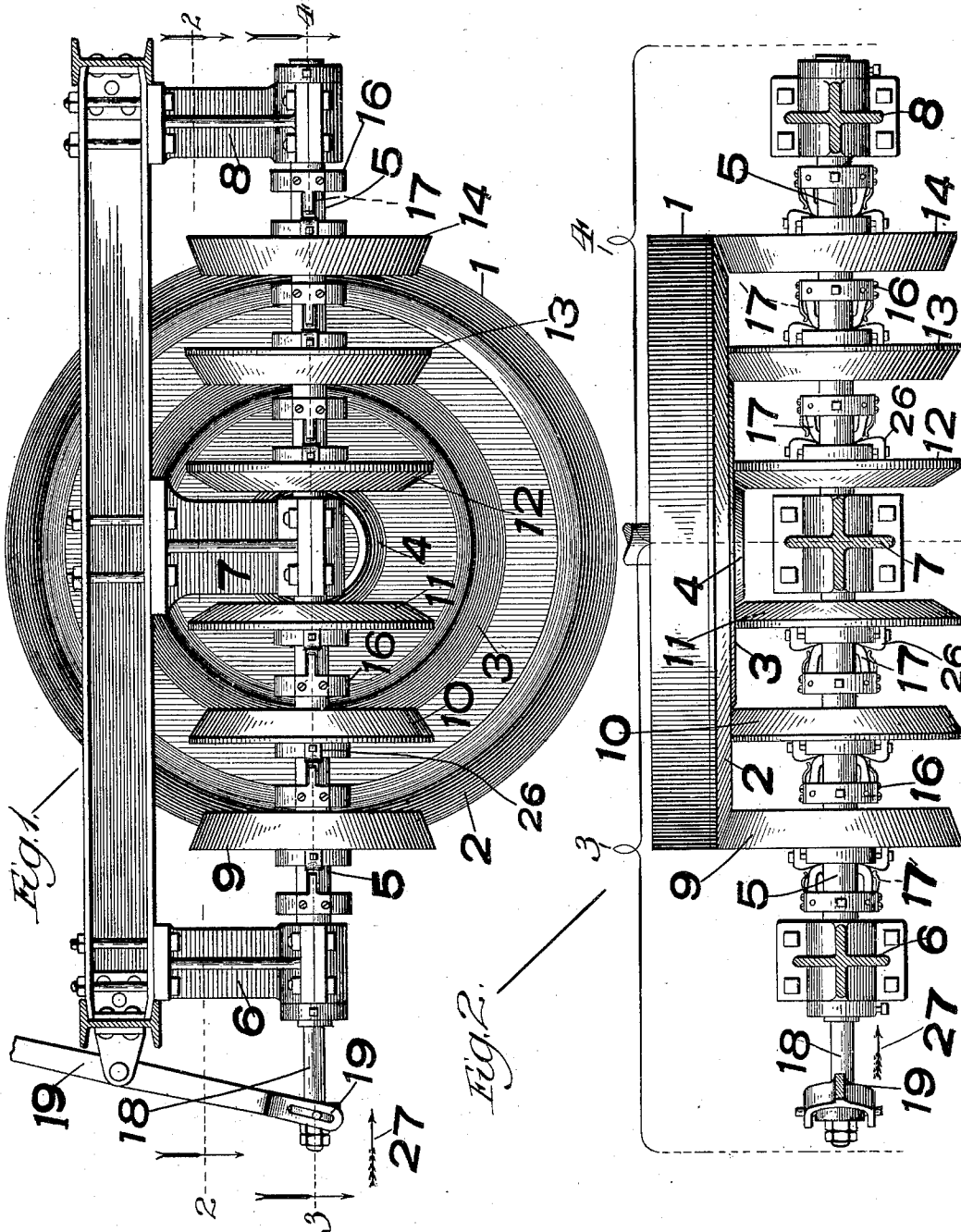
No. 738,814.

PATENTED SEPT. 15, 1903.

H. E. KELLOGG.
VARIABLE SPEED DEVICE.
APPLICATION FILED DEC. 20, 1902.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses.
Paul Chylard,
John Ender J.

Inventor.
Henry E. Kellogg
By Oscar Snell
Attorney

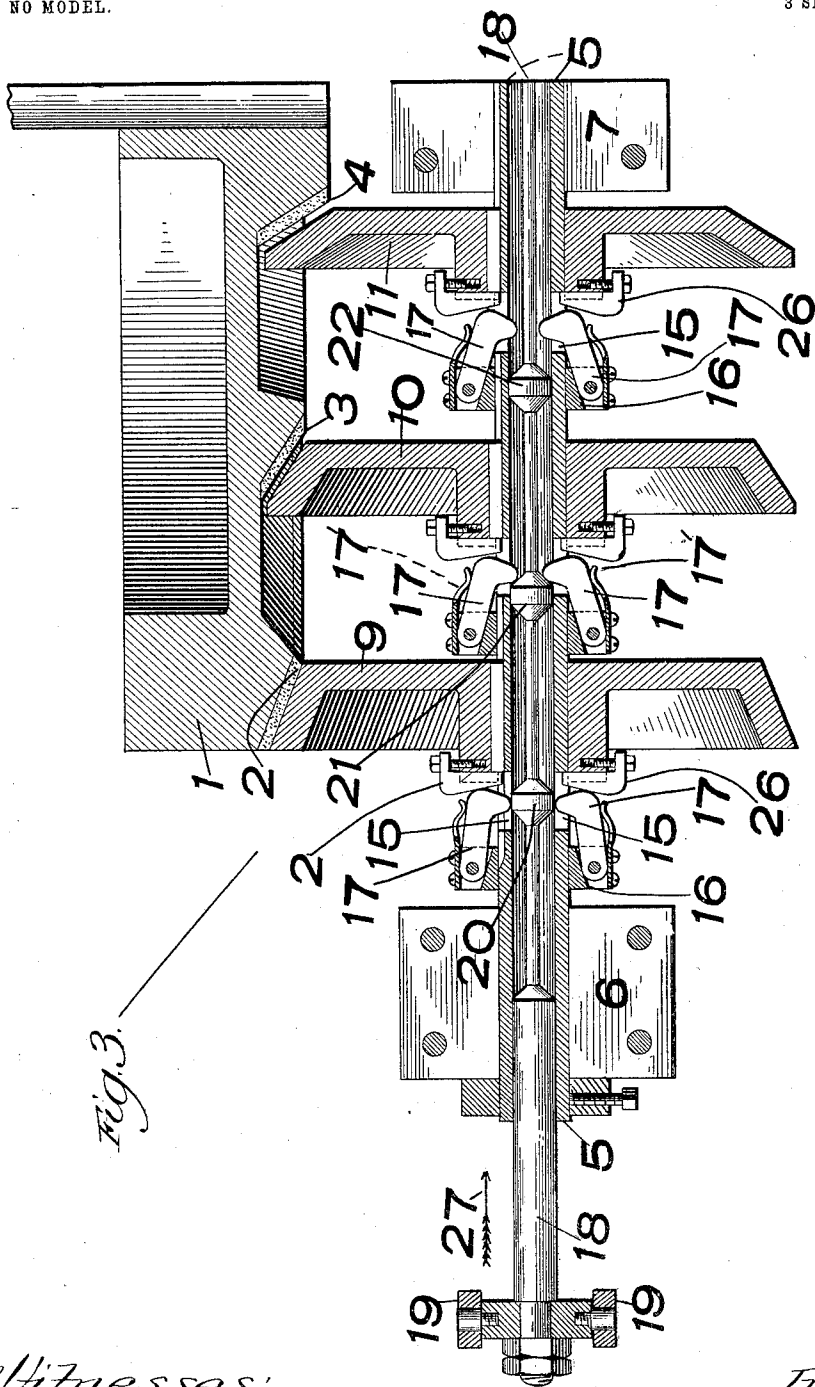
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3 SHEETS—SHEET 2.



Witnesses:
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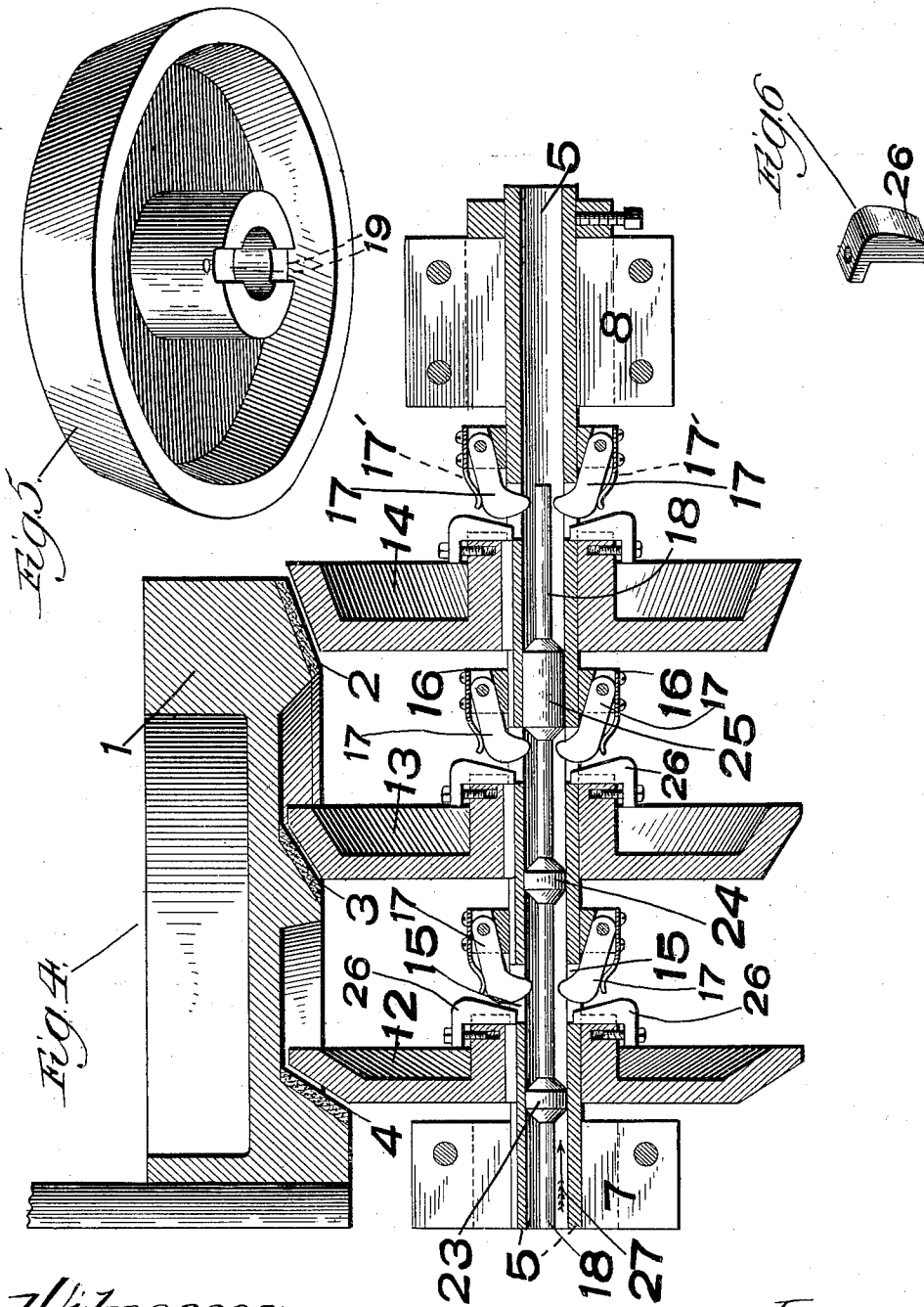
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3 SHEETS—SHEET 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

HENRY E. KELLOGG, OF HARVEY, ILLINOIS, ASSIGNOR OF ONE-HALF TO
GEORGE F. SWAIN, OF HARVEY, ILLINOIS.

VARIABLE-SPEED DEVICE.

SPECIFICATION forming part of Letters Patent No. 738,814, dated September 15, 1903.

Application filed December 20, 1902. Serial No. 136,017. (No model.)

To all whom it may concern:

Be it known that I, HENRY E. KELLOGG, a citizen of the United States, residing at Harvey, in the county of Cook and State of Illinois, have invented a new and useful Variable-Speed Device, of which the following is a specification.

My invention relates to power-transmitting devices; and my object is to provide means whereby a driving-shaft may not only transmit power at several different speeds, but also, if necessary, have the direction of revolution reversed, as may be desired in the management of automobiles, for which the invention is particularly adapted, although suited to use for many other purposes, the same being hereinafter more fully described, and illustrated in the accompanying drawings, in which—

Figure 1 is a cross-section through the frame of a motor-vehicle, showing in elevation hangers therefrom in which a shaft is mounted, and upon which latter are mounted a series of beveled friction-wheels, of which any one of the series is adapted to be brought singly into contact with a proper beveled surface on an adjacent friction driving-wheel, the latter being mounted on the end of a shaft, in this instance disposed at a right angle to the first-named shaft. Fig. 2 is a plan of what is shown in Fig. 1, the frame of the vehicle being removed and the shaft-hangers and a clutch-lever being shown in horizontal cross-section on broken line 2 2. Figs. 3 and 4 are horizontal axial sectional views of the parts shown in Fig. 1 on broken line 3 4, these drawings being upon separate sheets, the one half-section 3 in Fig. 3 being on one sheet and the other half-section 4 on the succeeding sheet. Fig. 5 is a perspective view of one of the small friction-wheels, showing radially and oppositely disposed square notches at the outer end of the hub. Fig. 6 is a perspective view of an L-shaped part which is disposed in the notches shown in Fig. 5 to serve the purpose of an inclined plane, against which as an abutment one of the parts of the clutch operates in sliding the wheel on the shaft upon which it is mounted and held by a spline to revolve therewith.

Similar numerals indicate like parts throughout the several views.

The large wheel 1 is mounted on a shaft, and we will suppose in this instance that it is the fly-wheel of a gas-engine, and therefore the driving-wheel. Wheel 1 is provided in this instance on the outer face with three beveled surfaces, such as 2, 3, and 4.

The driven shaft 5 is hollow throughout its length and extends entirely across under the vehicle-frame, being revolvably mounted in the lower ends of hangers 6, 7, and 8, and mounted on this shaft are beveled friction-wheels 9, 10, and 11, splines being attached to the shaft, so that the wheels may slide longitudinally thereon, yet be held to revolve therewith. Wheels 9, 10, and 11 are beveled at the periphery and are held in close proximity to the annular beveled faces 2, 3, and 4 of wheel 1, at one side of the center thereof. At the opposite side of the center of wheel 1 are similarly mounted on shaft 5 three other peripherally-beveled wheels 12, 13, and 14, also in close proximity, respectively, to beveled faces 4, 3, and 2 of wheel 1.

Close to one end of each of all the hubs of wheels 9, 10, 11, 12, 13, and 14 are two oppositely-disposed slots, such as 15, leading into the interior of shaft 5. Near each of slots 15 are collars 16, firmly mounted on shaft 5 and which serve to support a series of arms, such as 17, which are pivotally attached at one end in and at opposite sides of the collars, the other free ends of the arms being rounded and having a lateral rounded projection disposed in and operated through the slots into the interior of the shaft by virtue of springs 17', which have one end secured to the collars 16, as plainly shown in Figs. 3 and 4. Extending through shaft 5 is a rod 18, whose outer end is pivotally connected to lever 19, by which the rod is operated longitudinally within the shaft.

At proper intervals there are beveled collars 20, 21, 22, 23, 24, and 25 integral with rod 18, the collars being for the purpose of operating the arms 17 outwardly against the resiliency of springs 17' when the rod is moved longitudinally within the shaft. Disposed radially and within the notches 19,

Fig. 5, of the friction-wheels 9, 10, 11, 12, 13, and 14 are inclined planes 26, which are held in proper adjustment by means of screws, which latter engage with the wheel-hubs and with short arms projecting from the inclined planes. The inclined-plane pieces are in close proximity to the rounded free ends of arms 17 and are disposed to be contacted therewith. In the construction hereinbefore described the driving-shaft 5 may be revolved at three different speeds in either direction while the driving-wheel 1 is revolving in but one direction, which result may be attained as follows: We will suppose that Figs. 3 and 4 are joined together, as shown in Figs. 1 and 2, and that the rod 18 is in the position shown, with only the collar 20 on rod 18 in full contact with arms 17, in which event only wheel 9 would be forced into contact with the beveled face 2 of wheel 1 by the action of arms 17 in their outward movement in contact with the inclined planes 26, Fig. 3, and wheels 10, 11, 12, 13, and 14 would be free to revolve with shaft 5 at the same rate of speed as wheel 9. If now a slower speed is desired, a movement of rod 5 in the direction indicated by arrow 27 would first cause beveled collar 20 to move out of contact with the adjacent arms 17 and the latter by the action of springs 17' be moved inwardly out of contact with the inclined planes 26 and release wheel 9, and finally bring collar 21 into contact with the adjacent arms 17, which, sliding outwardly against the inclined planes at the hub of wheel 10, cause it to slide on the shaft and the wheel engage driving-wheel 1 at the beveled face 3, when shaft 5 would be revolved at a lower speed than when wheel 9 was in engagement. A still further movement of rod 18 in the same direction would in a similar manner as described in the release of wheel 9 and the engagement of wheel 10 also release wheel 10 and engage wheel 11, when the lowest speed of shaft 5 would be attained, because of the connection with the smallest annular beveled face on wheel 1. If the direction of revolution of shaft 5 has been such that a forward movement of the vehicle results and a backward movement is desired, if rod 18 is moved in the same direction as before beveled collar 22 will pass beyond the ends of the adjacent arms 17 and release wheel 11 and collar 23, Fig. 4, be brought into contact with adjacent arms 17, when wheel 12 on the opposite side of wheel 1 will be engaged with annular beveled face 4 and shaft 5 be revolved in a direction opposite that hereinbefore described. If rod 18 is again moved in the same direction as before, wheel 12 will be released and wheel 13 be engaged with beveled face 3 of wheel 1, and so on in the same manner wheel 13 will be released and wheel 14 be engaged with beveled face 2 by the action of collar 25. It is obvious that to return rod 18 to the initial position (shown in Figs. 3 and 4) or to a position still farther to the end next the operating-le-

ver collar 20 will be moved from engagement with the adjacent arms 17 and all the wheels would be successively and singly placed into and out of engagement with wheel 1, no two wheels being engaged at the same time, and finally all be out of engagement, so that wheel 1 may freely revolve without imparting any movement to the vehicle in either direction. It is also obvious that wheel 1 is out of engagement with all the friction-wheels on shaft 5 at a time between the disengagement and engagement of two adjacent wheels. When the operative parts are in the positions shown in Figs. 3 and 4, if it is desired to suddenly reverse the motion of shaft 5 it may be done by sliding rod 18 a short distance in a direction the reverse of that indicated by arrow 27, when collar 20 will be in the position to release the arms 17 and wheel 9 and collar 25 be moved to a position where the adjacent arms 17 will cause wheel 13 to be brought into contact with friction-surface 3 on wheel 1.

It will be understood that although this device has been shown and described hereinbefore as adapted to transmit power from a single driving-wheel it is obvious that power may be transmitted at a variable speed and in both directions, the reverse of what has been described, since power applied to shaft 5 would drive the wheel 1 at various speeds and in either direction by operating rod 18 in the manner stated, and would be adapted to transmitting power in automobiles and for many other useful purposes.

I claim as my invention—

1. The combination with a shaft, and a friction-wheel mounted thereon, of a driven shaft, a plurality of friction-wheels slidably mounted thereon, means mounted on said last-named shaft for forcing the said last-named friction-wheels into engagement with the said first-named friction-wheel, and means arranged in said driven shaft for operating the said means.

2. The combination with a shaft, of a plurality of friction-wheels slidably mounted thereon, a slidable rod, means for successively moving said friction-wheels when the said rod is moved, and a rotatably-mounted friction-wheel engaged by the said first-named friction-wheels.

3. The combination with a friction-wheel, of a plurality of slidably-mounted friction-wheels adapted to engage the said first-named wheel, and means for sliding said last-named wheels, said means comprising pivoted arms, and means for operating the same.

4. The combination with the hollow shaft formed with a series of openings of a plurality of friction-wheels slidably mounted on said shaft, a series of arms pivotally mounted on said shaft between said wheels, and having their free ends normally extending through the openings of said shaft, means arranged in said shaft for forcing said arms into engagement with the respective friction-wheels,

and a friction-wheel adapted to be engaged by the said first-named friction-wheels.

5 5. The combination with the hollow shaft, of a friction-gear slidably mounted on said shaft, an arm pivoted on said shaft and having its free end extending into the interior thereof, a rod mounted in said shaft, a collar secured to said rod for engagement with the said arm, and a friction-gear for engagement
10 with the said first-named gear.

15 6. The combination with a rotatably-mounted friction-wheel, of a shaft, a series of friction-wheels slidably mounted on said shaft at each side of the center of the first-named wheel, an operating means and means whereby as the said operating means is moved the wheels of both series will be successively moved into engagement with the first-named wheel.

20 7. The combination with a rotatably-mounted friction-wheel of a hollow shaft, two series

of oppositely-disposed friction-wheels slidably mounted on said shaft, movable members on said shaft for sliding said last-named friction-wheels into engagement with the first-named friction-wheel, and means arranged in said shaft for operating said movable members. 25

8. In combination with the rotatably-mounted friction-wheel, and a series of slidably-mounted friction-wheels, an operating means comprising means for engagement with said last-named wheels, and a means common to the last-named means and being adapted to successively operate the same. 30 35

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

HENRY E. KELLOGG.

Witnesses:

OSCAR SNELL,
ALBERT E. EBERT.