(No Model.) 2 Sheets—Sheet 1.

C. F. CHRISTOPHER.

DRIVING MECHANISM FOR ROAD ENGINES.

No. 483,281. Patented Sept. 27, 1892.

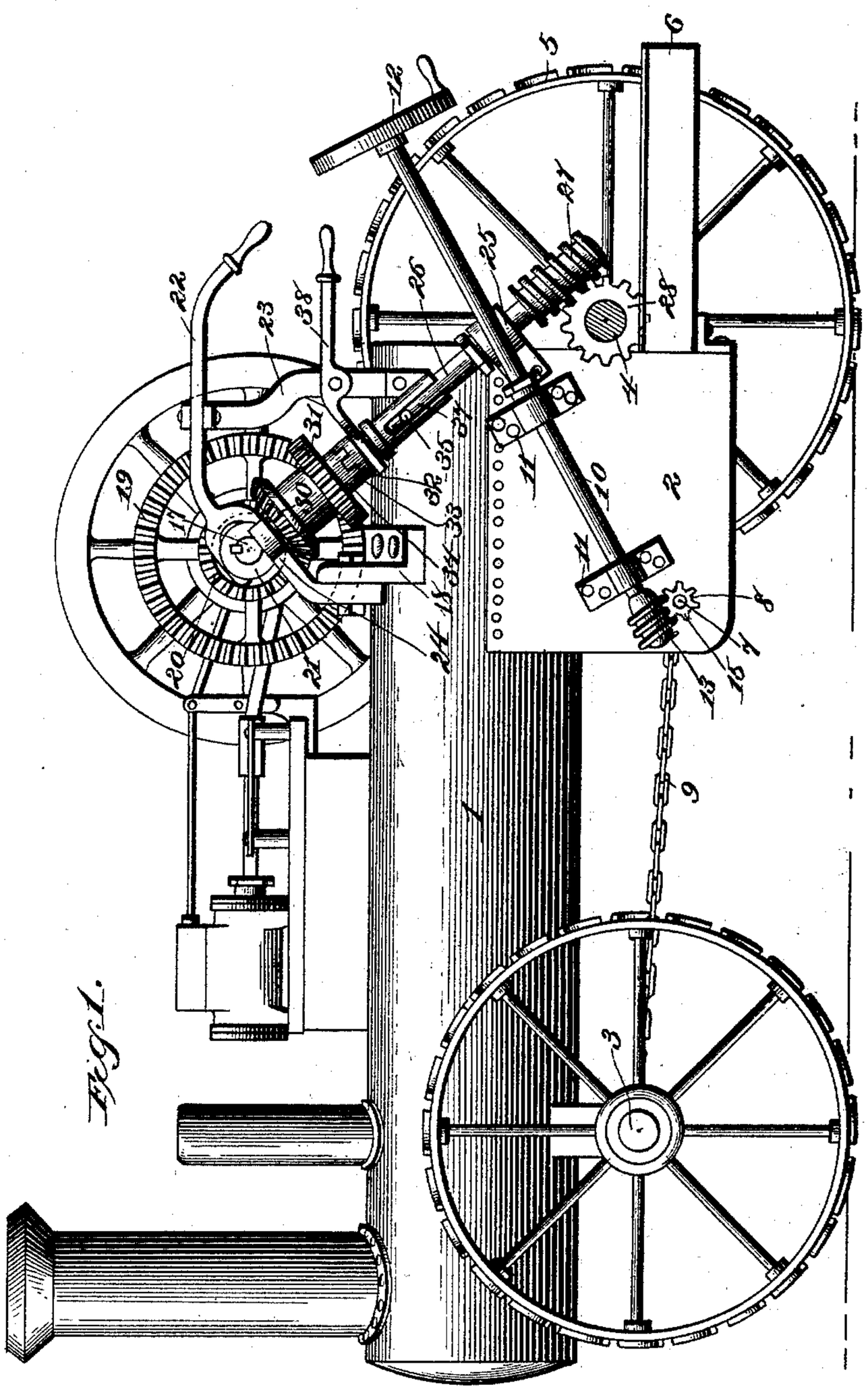

Fig. 1.

Witnesses:

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(No Model.) 2 Sheets—Sheet 2.

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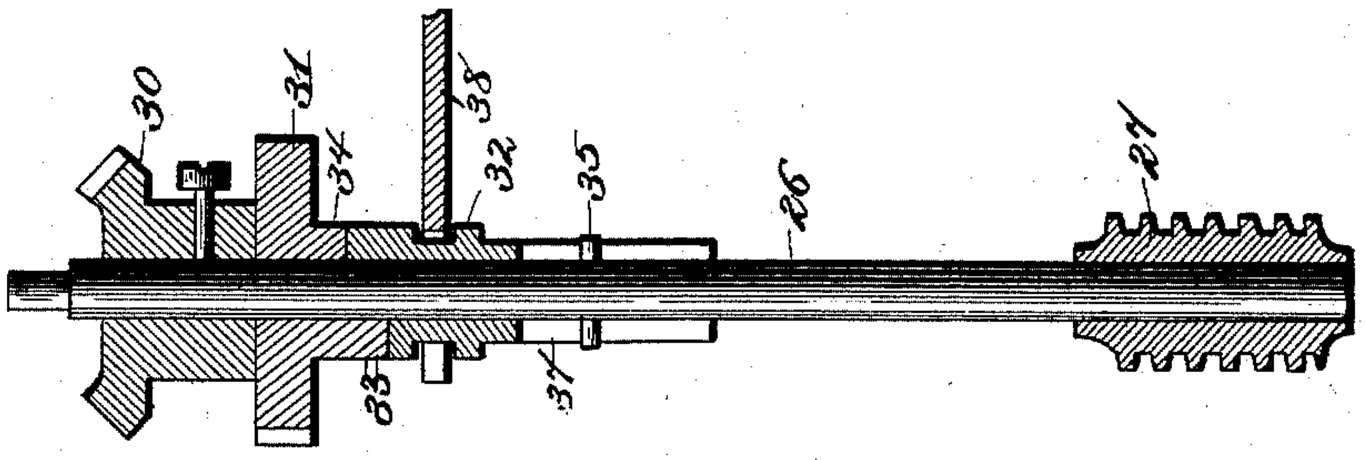

Fig. 3.

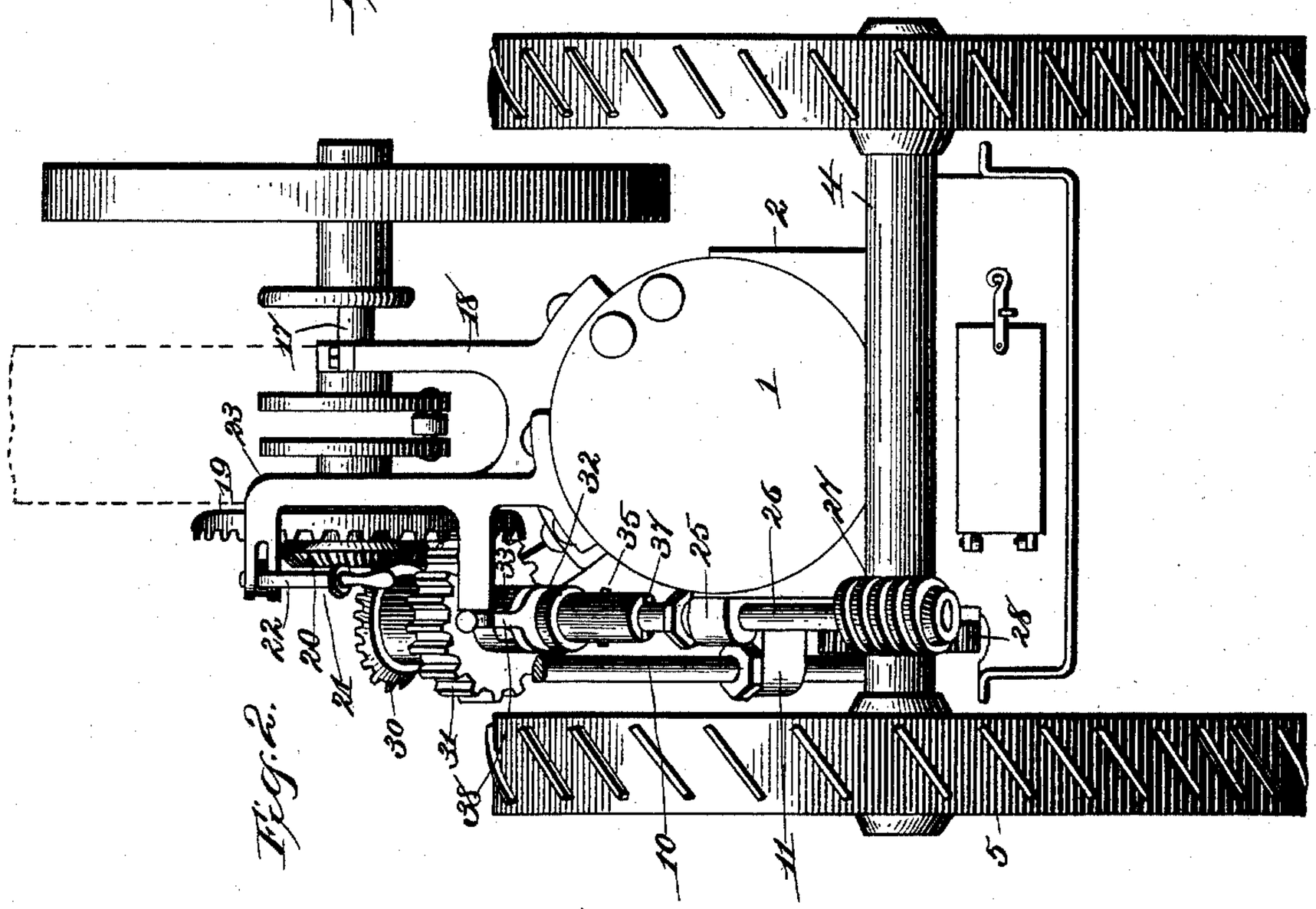

Fig. 2.

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UNITED STATES PATENT OFFICE.

CALVIN F. CHRISTOPHER, OF SPARTANBURG, SOUTH CAROLINA, ASSIGNOR OF ONE-HALF TO DAVID R. DUNCAN AND THOMAS C. DUNCAN, OF SAME PLACE.

DRIVING MECHANISM FOR ROAD-ENGINES.

SPECIFICATION forming part of Letters Patent No. 483,281, dated September 27, 1892.

Application filed December 2, 1891. Serial No. 413,788. (No model.)

To all whom it may concern:

Be it known that I, CALVIN F. CHRISTOPHER, a citizen of the United States, residing at Spartanburg, in the county of Spartanburg and State of South Carolina, have invented a new and useful Driving Mechanism for Traction-Engines, of which the following is a specification.

This invention relates to improvements in traction-engines, and has special reference to the drive mechanism therefor, the objects in view being to provide a simple and cheap arrangement of gearing between the crank-shaft of the engine and the drive-axle, which mechanism is adapted for exerting either power or speed, and is so constructed as to act as a brake in descending grades, which brake will be automatically applied at any attempt upon the part of the engine to gravitate.

Other objects and advantages of the invention will appear in the following description, and the novel features thereof will be particularly pointed out in the claims.

Referring to the drawings, Figure 1 is a side elevation of a traction-engine embodying my improvements. Fig. 2 is a rear elevation thereof. Fig. 3 is a longitudinal section through the inclined drive-shaft.

Like numerals of reference indicate like parts in all the figures of the drawings.

1 designates the boiler; 2, the fire-box; 3, the front axle carrying the guide-wheels; 4, the rear or drive axle carrying the traction-wheels 5 and the platform 6, upon which the engineer stands. A shaft 7 is mounted in bearings 8, transversely in front of the fire-box, and chains 9, connected to the front axle, have their rear ends reversely wound upon the shaft, whereby through the rotation of the shaft the axle may be given any inclination, and hence guided.

In a pair of diagonally-opposite bearings 11, secured to the side of the fire-box, a steering-shaft 10 is journaled, the same being provided at its rear end with a crank-wheel 12, while at its lower front end it carries a worm 13, which engages with and operates a small gear 15, mounted upon the shaft 7. By manipulating the wheel the steering-shaft is rotated, as is also the windlass-shaft around which the chains are wound, and thus the machine is guided in the usual manner.

Upon the boiler is mounted the ordinary engine, including in its make-up the crank-shaft 17, journaled in the frame 18. This shaft extends beyond one of its bearings, and has mounted thereon a large gear 19, having gear-teeth formed upon its outer face, said gear being fixed upon the shaft, and outside of the same a small bevel-gear or pinion 20, loosely mounted on the shaft and adapted to be made rigid therewith by means of a clutch 21, operated by a lever 22, mounted upon a standard 23, supported by the boiler-supporting frame. The extension of the crank-shaft-supporting frame is provided with a bearing 24, and the same is diagonally opposite or in an inclined plane with a bearing 25, extending from the boiler. In these bearings 24 and 25 a shaft 26 is journaled for rotation, and the same is provided at its lower end with a worm-gear 27, which engages with a toothed gear 28 upon the rear or drive axle, which drive-axle is rotated through the medium of its gear and the worm-gear.

At the upper end of the inclined power-shaft a beveled pinion 30 is fixedly mounted thereon and may be engaged with the beveled pinion of the crank-shaft of the engine by means of the shifting or clutch lever for operating the latter. Below the beveled pinion of the power-shaft there is mounted upon said shaft in a loose manner a toothed gear 31, larger than the beveled pinion of the power-shaft and in normal engagement with the large master-gear of the crank-shaft. A reciprocating clutch 32, mounted on the power-shaft, has its upper end toothed, as at 33, and is thereby adapted for engagement with the toothed hub 34 of the gear 31. The clutch is also slotted, as shown at 35, and receives a pin or spline 37, extending from the power-shaft. A lever 38, fulcrumed on the standard 23, serves to shift the clutch, and when the latter is thrown into operative connection with the hub of the gear the power-shaft moves with said gear.

In operation under ordinary circumstances, as when traveling on a level, the small beveled pinion of the crank-shaft of the engine

is by its clutch-lever thrown inwardly, so as to ride loosely upon the crank-shaft and be out of engagement with the beveled pinion of the power-shaft. The clutch of the power-shaft is thrown into operative connection with the toothed gear of said shaft, and the latter being operated by the master-gear of the engine imparts motion to the power-shaft, which is transmitted through the worm-gear and axle-gear to the traction-axle and wheels of the engine. The master-gear being larger than the toothed gear of the power-shaft, the speed will be increased with a commensurate decrease of power. Now while the worm-gear is capable of transmitting rotary motion to the axle through the medium of the toothed gear of said axle the reverse—that is, the axle-gear transmitting motion to the worm-gear and its power-shaft—is impossible, and hence any tendency upon the part of the engine when it reaches an incline to gravitate is checked, and said engine cannot move faster than does the power-shaft as actuated by the power. In this manner the power acts as an automatic brake to the movements of the machine and prevents the same from running downhill any faster than it would on a level, and the employment of extraneous brakes is obviated. If it be desired to ascend an incline, the clutch of the power-shaft is disengaged from the toothed gear thereof, so that the master-gear rotating will idly rotate said toothed gear, and the small beveled pinion of the crank-shaft is by its clutch or shifting lever thrown outwardly, so as to be made rigid with or fixed upon the crank-shaft of the engine and into engagement with the beveled gear of the power-shaft, so that under the well-known rule of applied mechanics the speed of rotation of the power-shaft is decreased, while the power exerted is increased, and hence the engine may be driven up heavy grades, inclines, &c.

From the foregoing description, taken in connection with the accompanying drawings, it will be readily obvious that I have provided an improved driving-gear between the engine of a traction-machine and the drive-axle thereof, which gear is so arranged as to act as an automatic check or brake to any abnormal speed to which the engine may tend, and may be changed so as to exert either speed or power by a simple manipulation of convenient levers within easy reach of the operator or engineer.

Having described my invention, what I claim is—

1. The combination, with the crank-shaft of a traction-engine, a gear mounted thereon, the drive-axle, and a gear mounted thereon, of an intermediate worm-gear mounted on the lower end of the shaft and meshing with the gear of the axle, a toothed gear loosely mounted on the upper end of the shaft and engaging with the gear of the crank-shaft and having a toothed hub, and a toothed clutch mounted for sliding and non-rotatably on the shaft and provided with a lever for operating the same, so as to engage the toothed hub of said gear, substantially as specified.

2. The combination, with the crank-shaft of a traction-engine, a master-gear mounted thereon, and a pinion mounted loosely on the shaft and provided with a shifting-lever for throwing the same into a fixed position with the shaft, of a drive-axle, a gear thereon, an inclined power-shaft, a gear on the lower end of said power-shaft engaging that of the axle, a pinion fixed on the upper end of the shaft and adapted to engage with the pinion of the crank-shaft when the latter is drawn outwardly by its shifting-lever, a toothed gear loosely mounted on the power-shaft and having a toothed hub and in mesh with the master-gear, a sliding clutch splined upon the power-shaft, toothed at its upper end, and a lever for throwing the same into engagement with the toothed hub of said gear, substantially as specified.

3. The combination, with the crank-shaft of a traction-engine, a master-gear mounted thereon, and a pinion mounted loosely on the shaft and provided with a shifting-lever for throwing the same into a fixed position with the shaft, of a drive-axle, a gear thereon, an inclined power-shaft, a worm-gear on the lower end of said power-shaft engaging that of the axle, a pinion fixed on the upper end of the shaft and adapted to engage with the pinion of the crank-shaft when the latter is drawn outwardly by its shifting-lever, a toothed gear loosely mounted on the power-shaft and having a toothed hub and in mesh with the master-gear, a sliding clutch splined upon the power-shaft, toothed at its upper end, and a lever for throwing the same into engagement with the toothed hub of said gear, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

CALVIN F. CHRISTOPHER.

Witnesses.
C. P. SANDERS,
JOHN B. CLEVELAND.