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PATENTED JULY 12, 1904.

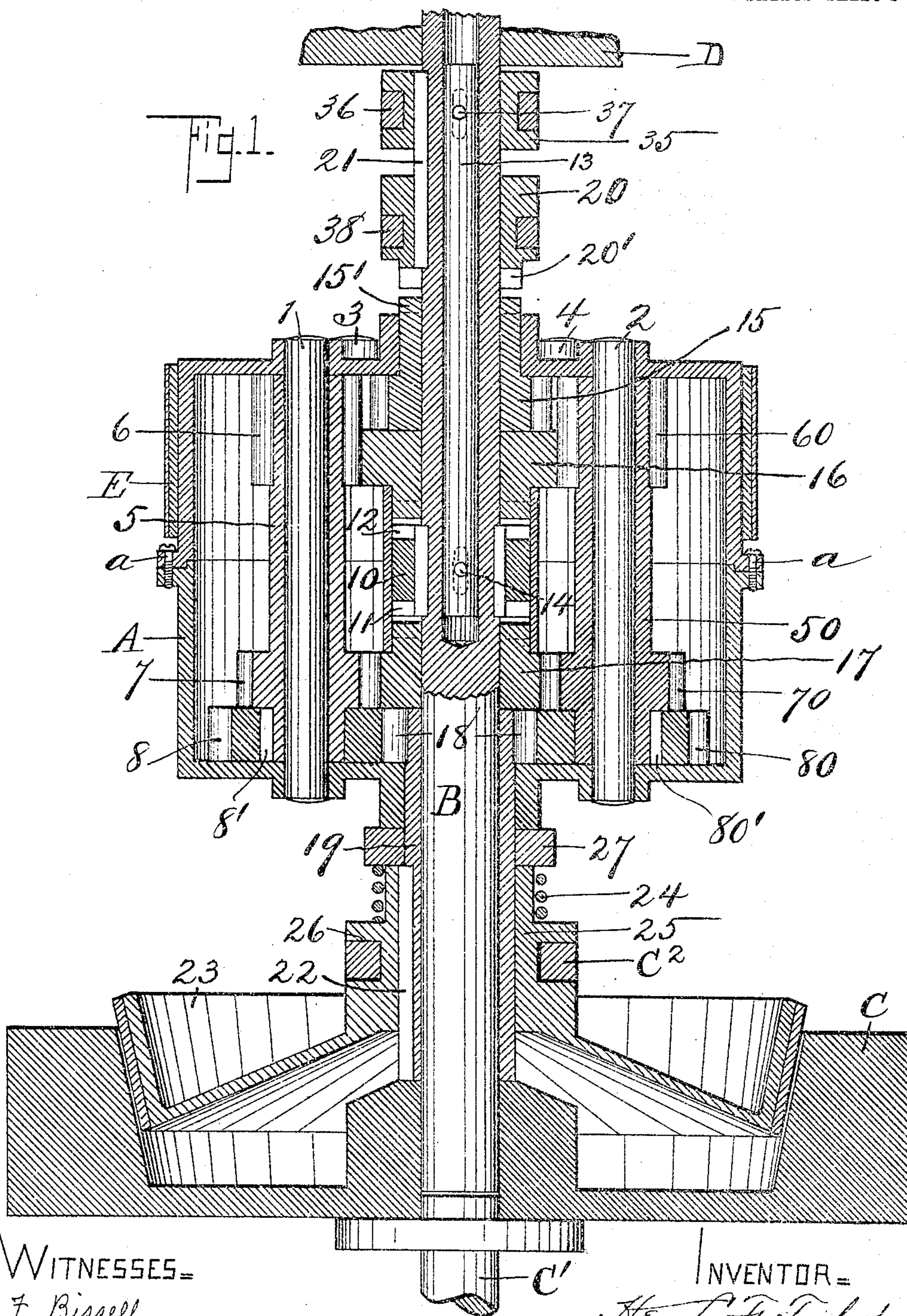
H. L. F. TREBERT.

VARIABLE SPEED TRANSMISSION GEARING.

APPLICATION FILED SEPT. 2, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES=

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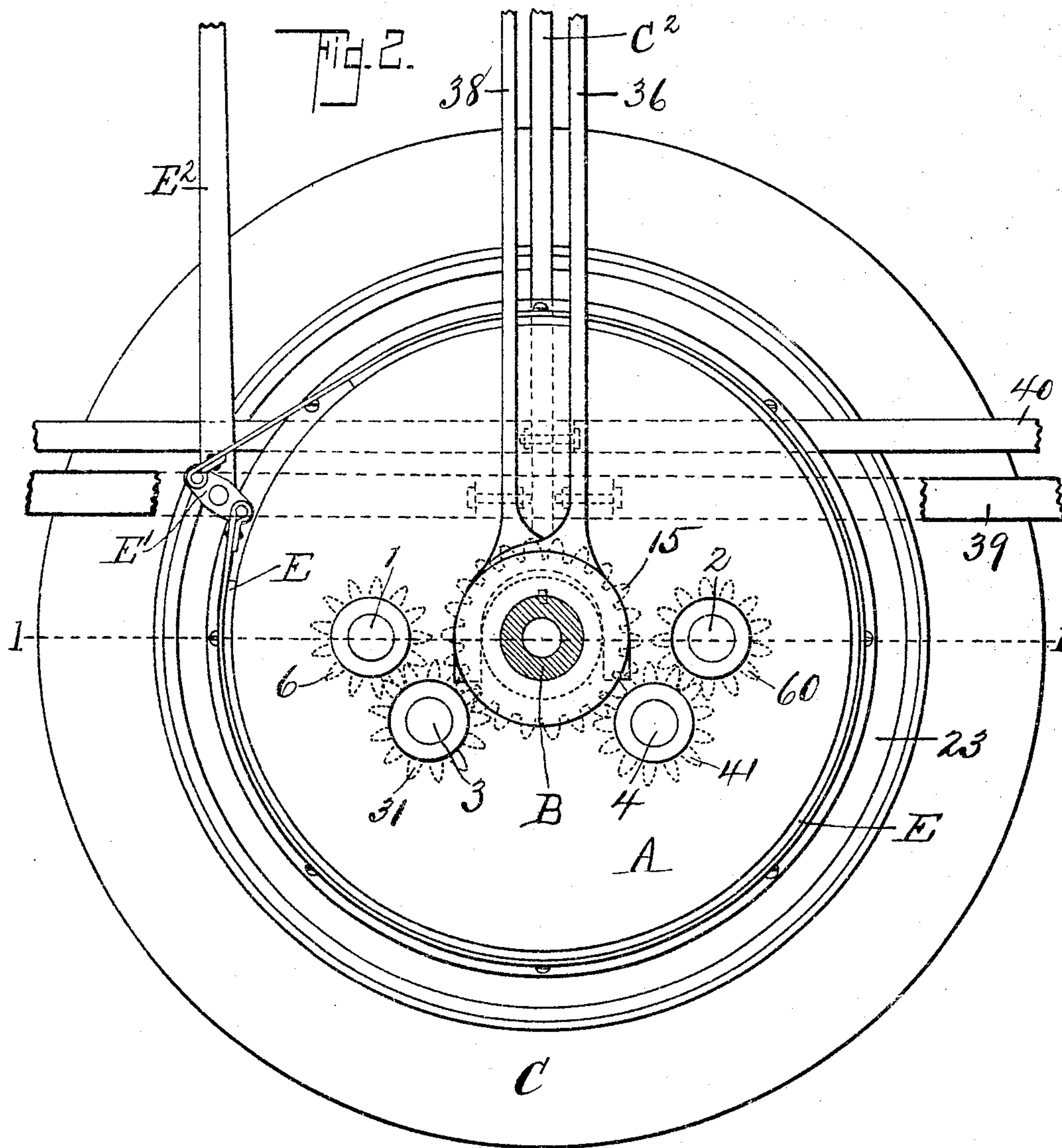
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UNITED STATES PATENT OFFICE.

HENRY L. F. TREBERT, OF ROCHESTER, NEW YORK.

VARIABLE-SPEED-TRANSMISSION GEARING.

SPECIFICATION forming part of Letters Patent No. 764,644, dated July 12, 1904.

Application filed September 2, 1902. Serial No. 121,719. (No model.)

To all whom it may concern:

Be it known that I, HENRY L. F. TREBERT, a citizen of the United States, and a resident of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Variable-Speed-Transmission Gearing, of which the following is a specification.

This invention relates to variable-speed-transmission gearing.

The object of the invention is to produce an effective gearing of this type adapted particularly for motor-vehicles embodying several changes of speed and a reversing-gearing.

In the drawings, Figure 1 is a horizontal section on the line 1 1 of Fig. 2 through the whole apparatus; and Fig. 2 is an end view looking from the upper side downward in Fig. 1, the wheel on the shaft being omitted.

A casing A, of cylindrical form and preferably split in the middle and held together by screws or bolts *a*, contains the gearing proper and constitutes the supports for various parts. Through the axis of the casing A runs the shaft B, on which the device is arranged. The casing A revolves freely upon the shaft B. In the support or casing A are four shafts 1, 2, 3, and 4, parallel to the shaft B and having end bearings in the ends of the casing A. The shaft 1 bears the loose sleeve 5, having upon its upper end a pinion 6 and near its lower end a pinion 7. On the lower end of the shaft 1, below the pinion 7, is a larger pinion 8, that may be integral with the sleeve 5 or may be fastened to it by a spline 8'. The shaft 2 bears a similar sleeve 50 and series of gears 60, 70, and 80, said last gear being fastened to the sleeve 50 by the spline or key 80'.

Upon the shaft B, substantially in the middle of the casing A, is a movable double clutch-block 10, having clutch-teeth 11 on one end and clutch-teeth 12 on the other end. The said clutch-block 10 is adapted to be moved by a rod 13 in a longitudinal bore in the axis of the shaft B and has a pin 14, connecting said rod 13 with the clutch-block 10. The shaft B is slotted, as shown, in order that the pin 14 may work longitudinally and operate the clutch-block 10. This clutch-block is adapted

to engage teeth on the hubs of either of two pinions, both of which are rotarily loose on the shaft B—viz., a pinion 16, meshing with the pinions 6 and 60, and a pinion 17, meshing with the pinions 7 and 70.

The pinion 8 meshes with a small pinion 18, formed on the end of a sleeve 19, that extends through the lower end of the casing A and carries a clutch member 23 on the other end of the sleeve.

The pinion 6 meshes not only with the pinion 16, but also with the pinion 31 on the shaft 3, which pinion 31 meshes with a pinion 15, revoluble upon the shaft B and having a hub extending out through the upper end of the casing A. The outward end of this hub has clutch-teeth 15', adapted to engage with clutch-teeth 20' upon a sleeve 20 on the shaft B and capable of longitudinal movement thereon in order to engage and disengage with the hub of the pinion 15, but connected to said shaft by a spline or feather 21, so as to be non-revoluble thereon. The pinion 60 meshes with a pinion 41 on the shaft 4, and said pinion 41 meshes with the pinion 15, above described.

The sleeve 19 above described surrounds the shaft B and is connected by a suitable feather or spline 22 to a movable friction-clutch member, such as the cone 23, which fits into a socket in the fly-wheel C of the engine from which the motive power is to be derived. This fly-wheel is connected with the engine in any suitable way—as, for example, by the shaft C'. The fly-wheel is therefore a driving clutch member and the cone 23 is a driven clutch member. A spring 24 presses against a flange on the hub 25 of the clutch member 23 and presses also against a block or collar 27, that rides loosely on the sleeve 19 and between the hub 25 and the lower end of the casing A, so that said spring 24 tends constantly to press the clutch member 23 into engagement with the fly-wheel C. The clutch member 23 may be pulled out of engagement with the fly-wheel C by means of a lever C', adapted to rest in a groove 26 in said hub 25.

The upper end of the shaft B carries a transmission-wheel D, such as a gear-wheel or a sprocket-wheel, whereby the power is transmitted from the engine-shaft C' to the object

to be driven—as, for instance, the wheel of a motor-vehicle.

The rod 13 for operating the double clutch-block 10 is connected with a grooved collar or sleeve 35, operated by a lever 36. The collar or sleeve 35 is fastened to the rod 13 by a pin 37, passing through the rod 13 and through slots (shown) in the shaft B and into the sleeve 35. The sleeve 35 is held so as to be non-rotatable on the shaft B by means of the feather or spline 21, whereby the sleeve 35 may have some longitudinal movement on the shaft B for operating the clutch-block 10. The clutch-block 20 is grooved and is operated by the lever 38. The levers 36 and 38 are suitably pivoted to a frame-piece 39 of the apparatus, and the lever C² is pivoted to a suitable frame-piece 40. (See Fig. 2.)

Outside of the casing A is a band E, having its two ends fastened to the ends of a lever E', fastened on a suitable frame-piece of the apparatus, such as 39, and operated by a bar or lever E². The tilting of the upper end of the lever E² toward the left in Fig. 2 tightens the band E upon the casing A, and the tilting of the lever E² toward the right in Fig. 2 loosens the band from said casing. This band acts as a brake to prevent rotation of the gear support or casing A and is employed in producing all but one of the different speeds accomplished by the apparatus and is also employed in bringing into operation the reverse rotation of the device.

The operation of the mechanism is as follows: The shaft C' and the fly-wheel C rotate constantly, and the friction clutch member 23 rotates with the fly-wheel normally and except when shifted away from the fly-wheel by the lever C². When the clutch-block 10 is disconnected from both of the pinions 16 and 17, no rotation is transmitted to the wheel D; but if the band E is firmly set on the casing A and the block 35 is shifted downward, connecting the clutch-block 10 with the pinion 17, the rotation of the clutch member 23 is transmitted to the sleeve 19 through the spline 22, thence through the small pinion 18 to the larger pinion 8, thence by the smaller pinion 7 to the pinion 17, that is now connected with the shaft B by the clutch-block 10, and thence to the wheel D, thus giving the highest speed through the gears, because the pinions 7 and 17 have the greatest difference. If the band E remains set on the casing A and the clutch-block 10 is shifted upward into connection with the pinion 16, the rotation of the clutch member 23 is transmitted by the sleeve 19, pinion 18, pinion 8, sleeve 5, pinion 6 to the pinion 16, and thence through the shaft B to the wheel D, thus producing a lower speed than through the pinion 17, because the difference in ratio of the gears in this last train is less than in the train above described. To reverse the rotation of the wheel D, the band E remains set on the casing

A, the clutch 20 is shifted, connecting with the hub of the pinion 15, and the clutch-block 10 is disconnected from both of the pinions 16 and 17. The clutch member 23 transmits power through the sleeve 19, pinion 18, pinion 8, sleeve 5, pinion 6, pinion 31, pinion 15, and thence to the shaft through the sleeve 20 upon the spline 21 and to the wheel D, and because the pinion 31 is interposed in this train of gearing the rotation of the wheel D is reversed.

It is to be remembered that in order to balance the operation of the device and to strengthen it there are duplicate trains of gearing on opposite sides of the shaft B, as described.

The highest speed of the wheel D is produced by releasing the band E from the casing A and shifting the clutch-block 10, so as to connect with one or the other of the clutch-pinions 16 or 17 and at the same time shifting the clutch-block 20, so as to put in operation the reverse-gearing. The shifting of the block 10 puts in operation the forward gearing, and the wheel would be driven forward, while the setting of the reverse-gearing would tend to drive the machine backward; but the use of these opposite combinations at the same time locks the parts directly to the shaft B, so that said shaft and the wheel D revolve with the same velocity as the clutch member 23. For the production of this highest speed the band E must be released from the casing A in order that said casing may revolve with the same speed as the shaft. For each of the other speeds and for the reverse the band E must be thrown onto the casing and tightened, so that the casing shall not revolve.

It is obvious that by operating the lever C² the clutch member 23 is disengaged from the fly-wheel C, and the engine or fly-wheel may run on, while the wheel D and the differential gearing remain unaffected.

What I claim is—

1. In a variable-speed gearing, the combination of a driving clutch member, a driven clutch member, a shaft having a movable double clutch-block non-rotatable thereon, a pair of clutch-pinions of different sizes loose on the shaft and with either of which said clutch-block may engage, a support surrounding the shaft, a pair of connected pinions on said support meshing with both of said clutch-pinions, a sleeve surrounding the shaft and driven by said driven clutch member, pinion means adapted to drive said connected pinions from said sleeve, releasable means for holding said support stationary, and means for shifting said clutch-block.

2. In a variable-speed gearing, the combination of a driving clutch member, a driven clutch member, a shaft having a movable double clutch-block non-rotatable thereon, a pair of clutch-pinions of different sizes loose on the shaft and with either of which said

clutch-block may engage, a support surrounding the shaft, a pair of connected pinions on said support meshing with both of said clutch-pinions, a sleeve surrounding the shaft and driven by said driven clutch member, pinion means adapted to drive said connected pinions from said sleeve, releasable means for holding said support stationary, means for shifting said clutch-block, a third pinion, a pinion loose on the shaft in gear with one of said connected pinions through said third pinion, and a clutch for connecting said last-mentioned pinion with the shaft.

3. In a variable-speed gearing, the combination of a driving clutch member, a driven clutch member, a shaft, a pair of pinions loose on the shaft, means for connecting either pinion with the shaft and disconnecting the other from the shaft, a support surrounding the shaft, a pair of connected pinions carried by said support and meshing with the pair of first-mentioned pinions, a pinion driven by said driven clutch member and adapted to drive said connected pinions, releasable means for holding the support stationary, and means for connecting either of the first-mentioned pinions with the shaft.

4. In a variable-speed gearing, the combination of a driving clutch member, a driven clutch member, a shaft, a pair of pinions loose on the shaft, means for connecting either pinion with the shaft and disconnecting the other from the shaft, a support surrounding the shaft, a pair of connected pinions carried by said support and meshing with the pair of first-mentioned pinions, a pinion driven by said driven clutch member, and means for driving said connected pinions thereby, releasable means for holding the support stationary, means for connecting either of the first-mentioned pinions with the shaft, a third pinion, a pinion loose on the shaft, in gear with one of said connected pinions through said third pinion, and a clutch for connecting said last-mentioned pinion with the shaft.

5. In a variable-speed gearing, the combination of a driving device, a driving-pinion thereon, a shaft, a pair of pinions of different sizes loose on the shaft, means for connecting either of said pinions with the shaft, a support carried by the shaft, a pair of connected pinions carried by the support and meshing with the first-mentioned pair of pinions, a pinion for driving said pair of con-

nected pinions from said driving-pinion, and releasable means for holding said support stationary.

6. In a variable-speed gearing, the combination of a driving device, a driving-pinion thereon, a shaft, a pair of pinions of different sizes loose on the shaft, means for connecting either of said pinions with the shaft, a support carried by the shaft, a pair of connected pinions carried by the support and meshing with the first-mentioned pair of pinions, a pinion for driving said pair of connected pinions from said driving-pinion, releasable means for holding said support stationary, a third pinion, a pinion loose on the shaft in gear with one of said connected pinions through said third pinion, and a clutch for connecting said last-mentioned pinion with the shaft.

7. In a variable-speed gearing, the combination of a driving clutch member, a driven clutch member, means for connecting and disconnecting the same, a shaft having a movable double clutch-block non-rotatable thereon, a pair of clutch-pinions of different sizes loose on the shaft and with either of which said clutch-block may engage, a support surrounding the shaft, a pair of connected pinions on said support meshing with both of said clutch-pinions, a sleeve surrounding the shaft and driven by said driven clutch member, pinion means adapted to drive said connected pinions from said sleeve, releasable means for holding said support stationary, and means for shifting said clutch-block.

8. In a variable-speed gearing, the combination of a driving clutch member, a driven clutch member, means for connecting and disconnecting the same, a shaft, a pair of pinions loose on the shaft, means for connecting either pinion with the shaft and disconnecting the other from the shaft, a support surrounding the shaft, a pair of connected pinions carried by said support and meshing with the pair of first-mentioned pinions, a pinion driven by said driven clutch member and adapted to drive said connected pinions, releasable means for holding the support stationary, and means for connecting either of the first-mentioned pinions with the shaft.

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Witnesses:

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