No. 763,548. PATENTED JUNE 28, 1904.

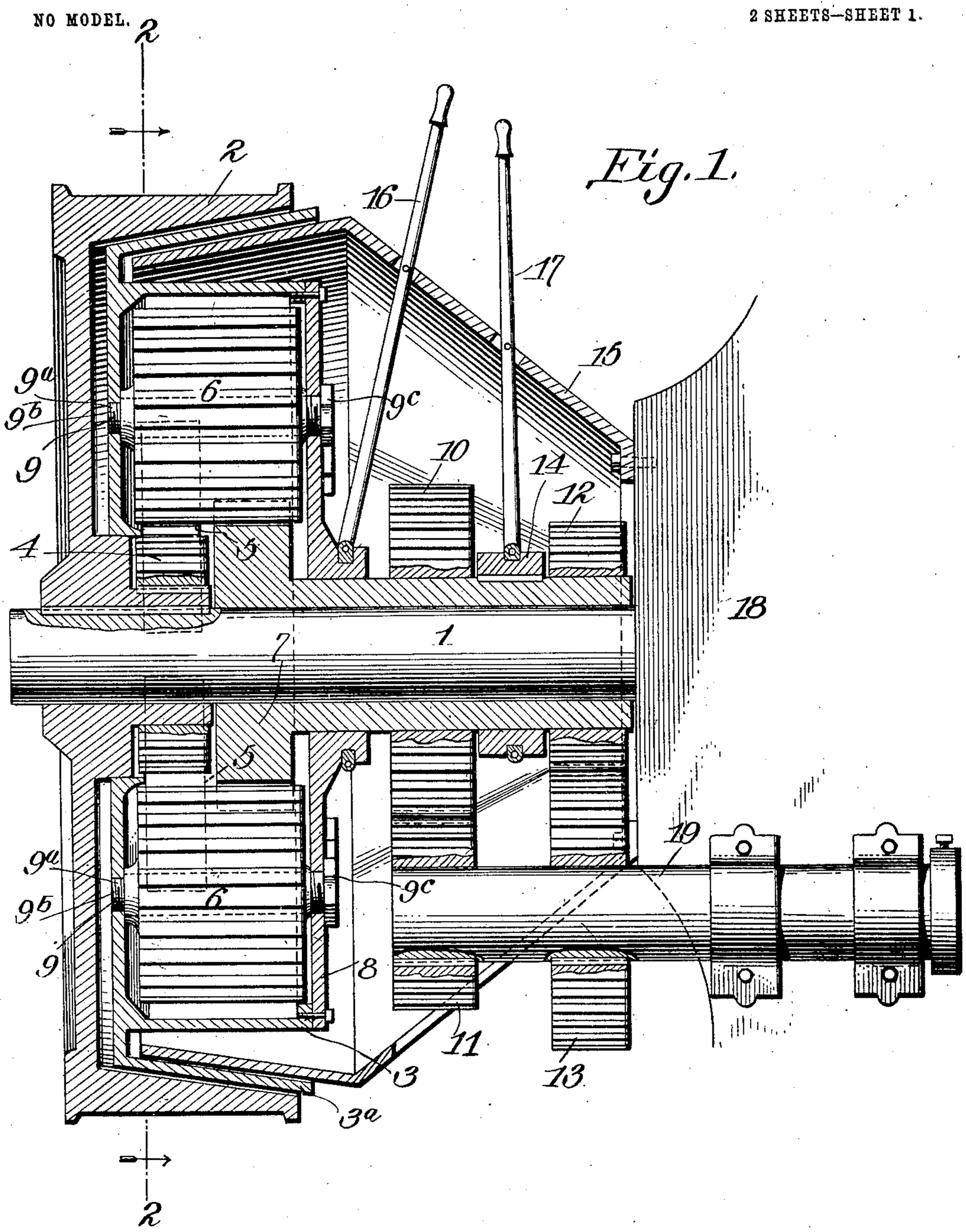
F. A. FERGUSON.

TWO-SPEED REVERSING GEAR.

APPLICATION FILED AUG. 21, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



Witnesses
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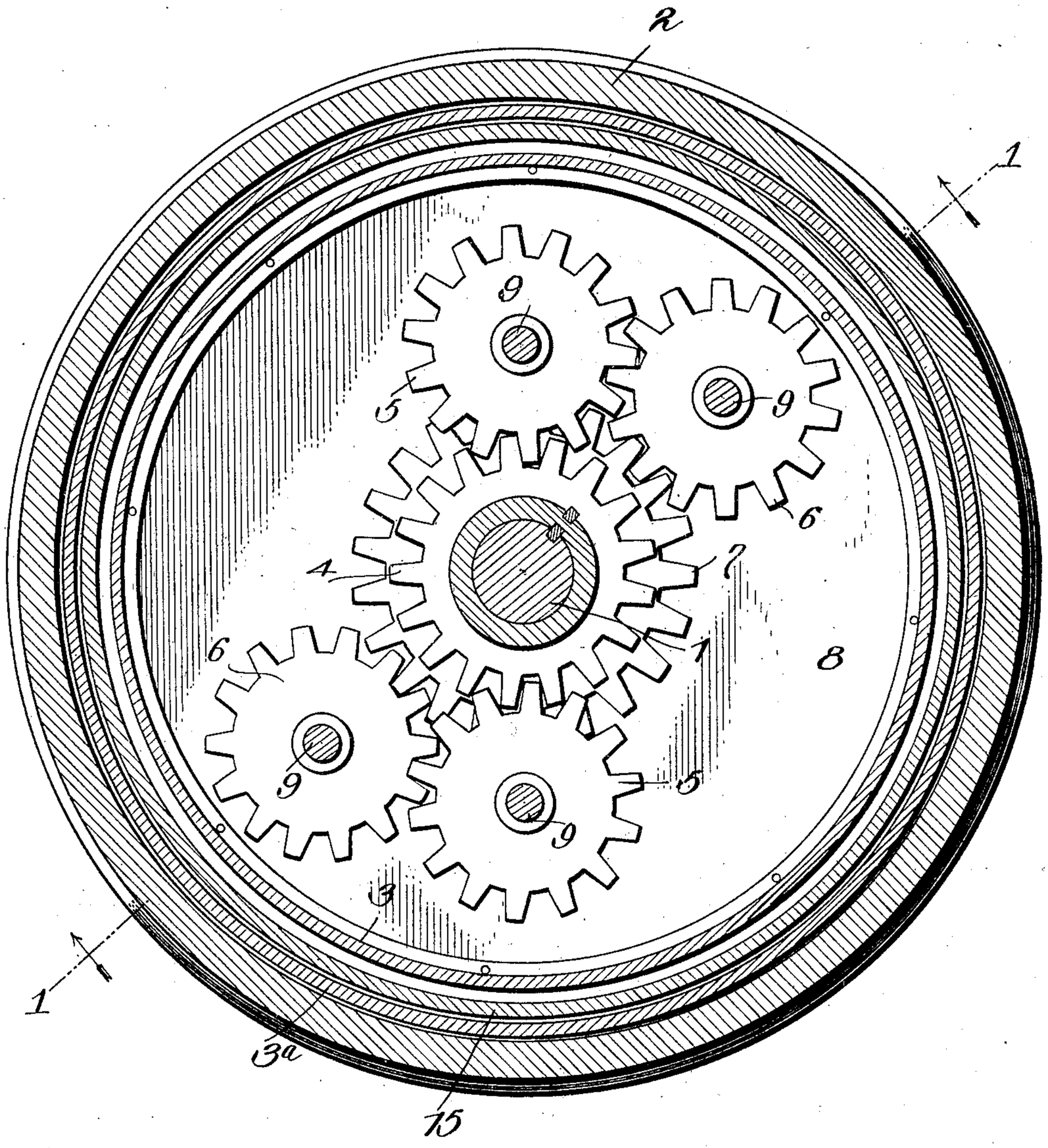
NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

FRANK A. FERGUSON, OF BLANCHARD, IOWA.

TWO-SPEED REVERSING-GEAR.

SPECIFICATION forming part of Letters Patent No. 763,548, dated June 28, 1904.

Application filed August 21, 1903. Serial No. 170,344. (No model.)

To all whom it may concern:

Be it known that I, FRANK A. FERGUSON, a citizen of the United States, residing at Blanchard, in the county of Page and State of Iowa, have invented a new and useful Two-Speed Reversing-Gear, of which the following is a specification.

This invention relates to a two-speed reversing-gear and friction-clutch designed for use on traction-engines, motor-vehicles, marine engines, and machinery generally.

The object of the invention is to provide an improved device of the character specified in which the pinions are always kept in mesh, in which the greater portion of the mechanism is protected by an oil-tight casing, so that injury from grit is effectively prevented, and which will be easy to operate to effect a change of speed or a reversal of the direction of movement.

With the objects above stated and others in view the invention consists in the construction and combination of parts of a two-speed gearing and friction-clutch hereinafter described and shown in the accompanying drawings, forming part of this specification, it being understood that various changes in the form, proportions, and exact mode of assemblage of the elements exhibited may be resorted to without departing from the spirit of the invention or sacrificing any of the advantages thereof.

In the drawings, Figure 1 is a view in section through the fly-wheel and the gear-casing in the plane of the engine-shaft, the plane of the view being indicated by the line 1 1 in Fig. 2 and the direction of the view being shown by the arrows. Fig. 2 is a view in section on the line 2 2 of Fig. 1 looking in the direction indicated by the arrows.

Referring to the drawings, in which corresponding parts are designated by the same characters of reference throughout both views, 1 designates an engine-shaft upon which is rigidly mounted a fly-wheel 2, having a flange at the periphery to carry a belt and having the inner face of the flange inclined, as shown, to form a friction-surface for engagement with a movable clutch-shoe 3^a, provided on a movable gear-casing 3. The gear-casing 3 is slidable upon the hub of the fly-wheel 2 and incloses a pinion 4 of small diameter, rigidly mounted upon a reduced portion of the hub of the fly-wheel, gears 5 meshing with the pinion 4 and gears 6 meshing with the gears 5 and with a gear 7, loosely journaled on the engine-shaft and having a sleeve which encircles the engine-shaft and projects out of the casing, as shown. The gears 5 are considerably narrower than the pinion 4 to permit lateral movement of the casing without causing contact of the sides of the gears 5 with the side of the gear 7 or with the hub of the fly-wheel. The gears 6, however, are wide in order that they may mesh with the gear 7 and with the gears 5 at all times. In order to support the gears 5 and 6 within the casing, shafts 9 are provided with screw-threaded reduced ends 9^a, raised screw-threads 9^b near the other ends, and heads 9^c, by means of which shafts may be turned to cause the engagement of the threads thereon with suitable threaded openings in the casing 3 and a closure-plate 8, which is bolted to the casing at its periphery, as best seen in Fig. 1. The threads upon the shafts 9 are cut so that the turning of the gears thereon when the device is in operation will tend to tighten the shafts in the threaded openings provided therefor.

On the sleeve extending from the gear 7 out through the closure-plate 8 of the casing are loosely journaled a large gear 10 and a smaller gear 12, which mesh with a smaller gear 11 and large gear 13, respectively, upon a shaft 19, which is disposed parallel to the engine-shaft. In order to form an operative connection between the gear 7 and the gears 10 and 12, there is slidably mounted upon the sleeve of the gear 7 between the gears 10 and 12 a clutch member 14, which is adapted to engage positively with either of said gears.

In order to hold the gear-casing 3 stationary when it is desired to reverse the direction of movement of the shaft driven by the gear, the stationary clutch-shoe 15 is mounted upon suitable arms bolted to the engine-frame 18 and disposed just inside the friction-shoe 3^a,

carried by the gear-casing 3. So by shifting the gear-casing a very short distance longitudinally of the engine-shaft in either direction the friction-shoe 3ª may be brought into engagement with the friction-surface on the flange of the fly-wheel or with the stationary clutch-shoe 15. The shifting of the casing is effected by means of a lever 16, pivotally mounted upon one of the arms supporting the clutch-shoe 15 and connected with a ring supported in an annular groove upon an extension of the closure-plate 8. The shifting of the clutch member 14 to form operative connection between the gear 7 and the gear 10 or the gear 12 is accomplished by means of a similar lever 17, also pivoted to one of the arms supporting the clutch-shoe 15 and connected with a ring supported in a groove on the clutch member.

In operation the clutch-shoe 3ª, carried by the casing 3, will be brought into engagement with the friction-surface provided on the inside of the belt-carrying flange of the fly-wheel when it is desired to drive the gear 7 with the engine-shaft 1, which is continuously driven in one direction. When the clutch-shoe 3ª is locked to the fly-wheel by engagement with the friction-surface provided on the inside of the fly-wheel flange, the gears 5 and 6 will not rotate upon their shafts, but will travel with the gear-casing and the fly-wheel, as will the gear 7, which is in mesh with the gears 6. The speed at which the shaft 19 will be driven will be determined by the engagement of the clutch member 14 with the gear 10 or the gear 12. When the clutch member 14 is brought into engagement with the gear 10, the shaft 19 will be driven at fast speed, as will be obvious, and when the member 14 is in engagement with gear 12 the shaft 19 will be driven at slow speed. When it is desired to stop the movement of the shaft 19, the clutch member 14 will be shifted to intermediate position between the two gears 10 and 12, and said gears will slip freely upon the sleeve of the gear 7. When it is desired to drive the gear 7 in the opposite direction to the movement of the engine-shaft, the gear-casing 3, with the gears 5 and 6, supported thereby, will be shifted longitudinally of the shaft 1 by means of the reversing-lever 16 and the clutch-shoe 3ª will be brought into locking engagement with the stationary clutch-shoe 15. The gear-casing 3 will then be held stationary, and the gears 5 and 6 turning upon their shafts will impart movement to the gear 7 in the reverse direction to that of the engine-shaft.

From the foregoing description and the accompanying drawings it will be readily seen that the meshing of the pinions in the apparatus is always the same, that most of the mechanism is protected within an oil-proof casing, and that the reversal of the direction of movement or the change of speed can be brought about instantly and with very little difficulty. It will also be seen that the entire structure is one of extreme simplicity, with no parts that will be broken, and that consequently the action will at all times be positive and certain.

While in the foregoing description it has been assumed that the shaft 1 will be the shaft from which power is imparted to the gear mechanism and thence to the shaft 19, it is obvious that the relation may be reversed, if so desired, and I do not wish to be limited to either arrangement to the exclusion of the other.

Having thus described the construction and operation of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination in apparatus of the class described, of a shaft, a pinion fast on the shaft, a pinion loose upon the shaft and having a sleeve encircling the shaft, a gear-casing inclosing said pinions, gearing carried by said casing continuously in mesh with both of said pinions, a pair of gears of different sizes loosely journaled upon said sleeve, devices for locking said gear-casing in stationary position or for rotation with said shaft, and means for locking either of the pinions upon the sleeve for rotation therewith.

2. The combination in apparatus of the class described, of a shaft, a fly-wheel fixed thereon, a pinion fixed upon the hub of the fly-wheel, a pinion loose on the shaft adjacent to the fixed pinion and having a sleeve extending longitudinally of the shaft, a gear-casing mounted upon the hub of said fly-wheel and the sleeve of the loose pinion and rotatably and longitudinally movable thereon, gearing within said casing continuously in mesh with both of said pinions, gears of different sizes loosely journaled upon said sleeve and spaced apart, a positive clutch member slidable on said sleeve between said gears, clutching devices for locking said gear-casing to the fly-wheel or in stationary position, and means for shifting the clutch member between the gears on said sleeve.

3. The combination in apparatus of the class described, of a shaft, a fly-wheel fixed thereon, a pinion fixed on the hub of the fly-wheel, a pinion loose on the shaft adjacent to the fixed pinion and having a sleeve formed integral therewith and extending longitudinally of the shaft, a gear-casing slidably mounted upon the hub of the fly-wheel and the sleeve of the loose pinion, pinions rotatably mounted in said casing and continuously in mesh with said fixed pinion, elongated pinions mounted in said casing and in mesh with the other pinions mounted therein and with the loose pinion on said shaft, clutch members by means of which said casing may be locked to said

fly-wheel or held stationary, gears of different sizes loosely journaled upon said sleeve and spaced apart, a shaft parallel with the first-mentioned shaft, gears fixed thereon and in mesh with the gears loosely journaled on the first-mentioned shaft, and means for shifting the clutch members.

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

FRANK A. FERGUSON.

Witnesses:

RALPH HUSTON,

M. BRYANT.