No. 793,218. PATENTED JUNE 27, 1905.

J. G. O'KELLY.

SPEED REDUCING DEVICE FOR MOTORS OR DYNAMOS.

APPLICATION FILED MAY 7, 1902.

2 SHEETS—SHEET 1.

Fig. 1.

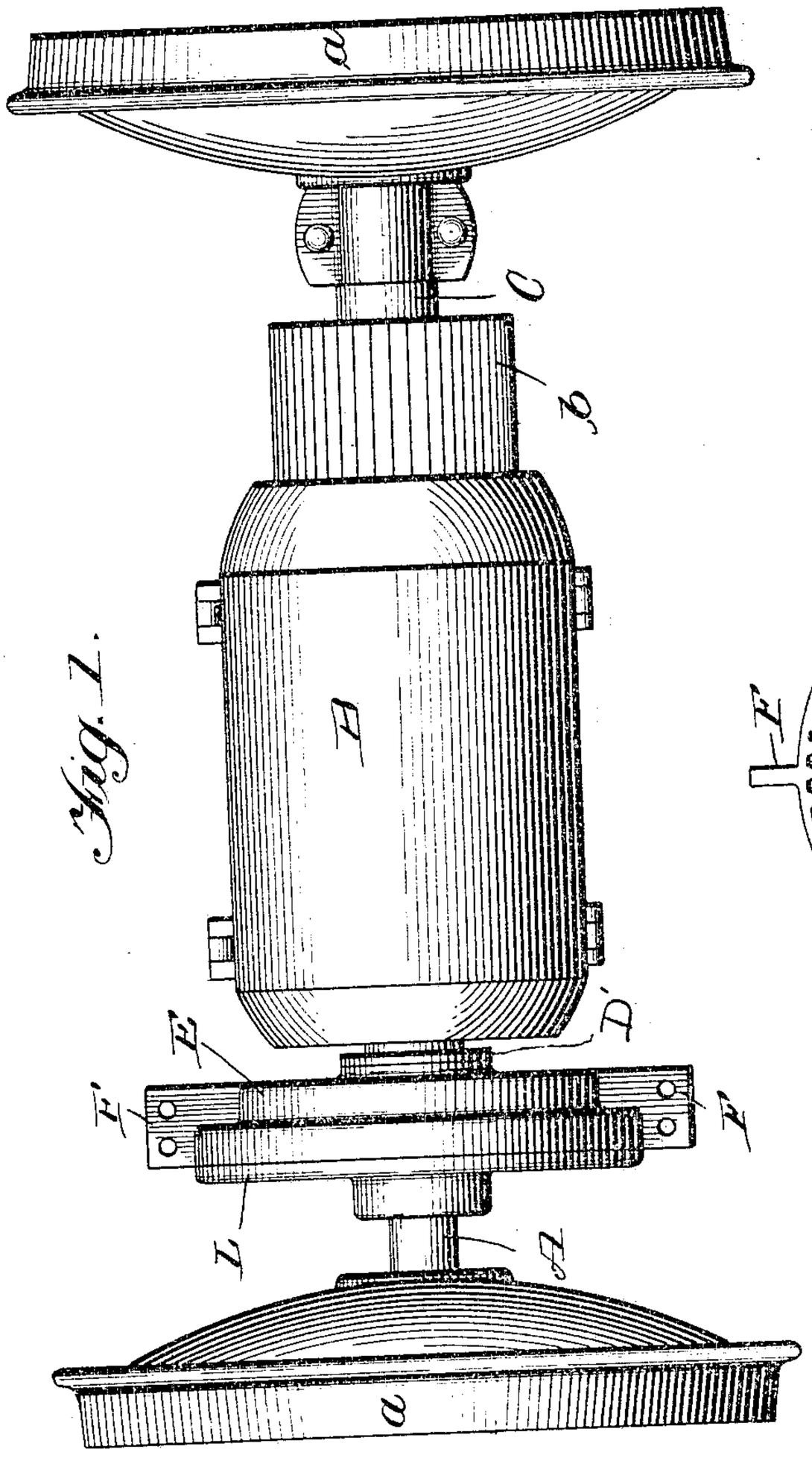
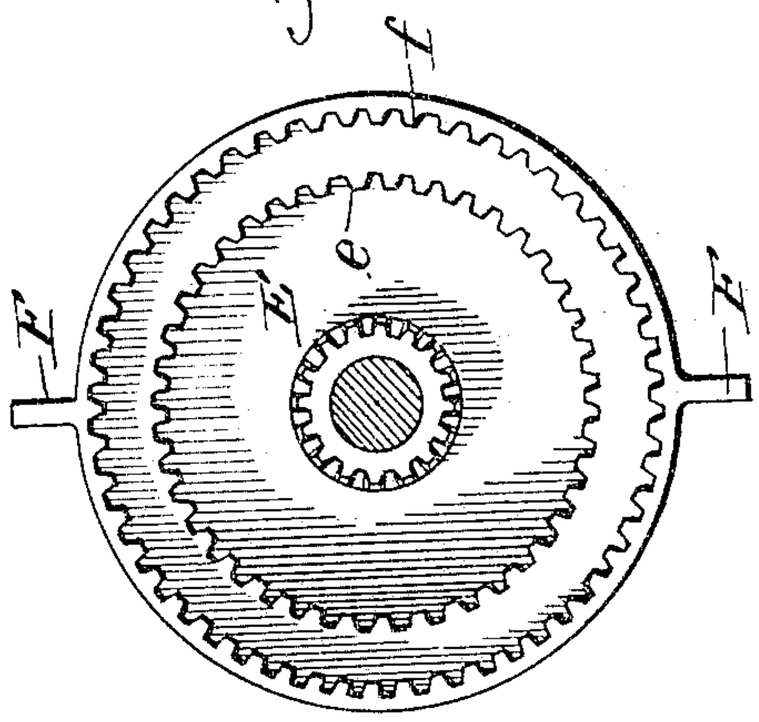


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 3.

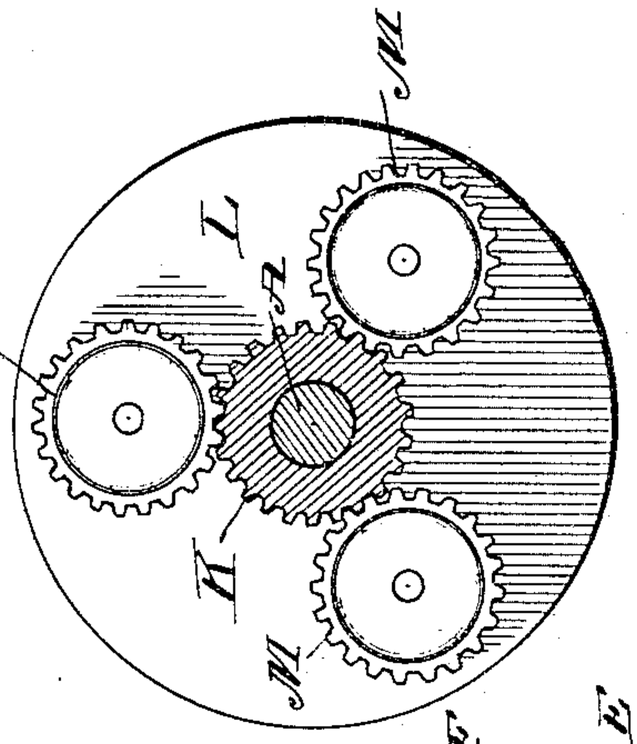

Fig. 4.

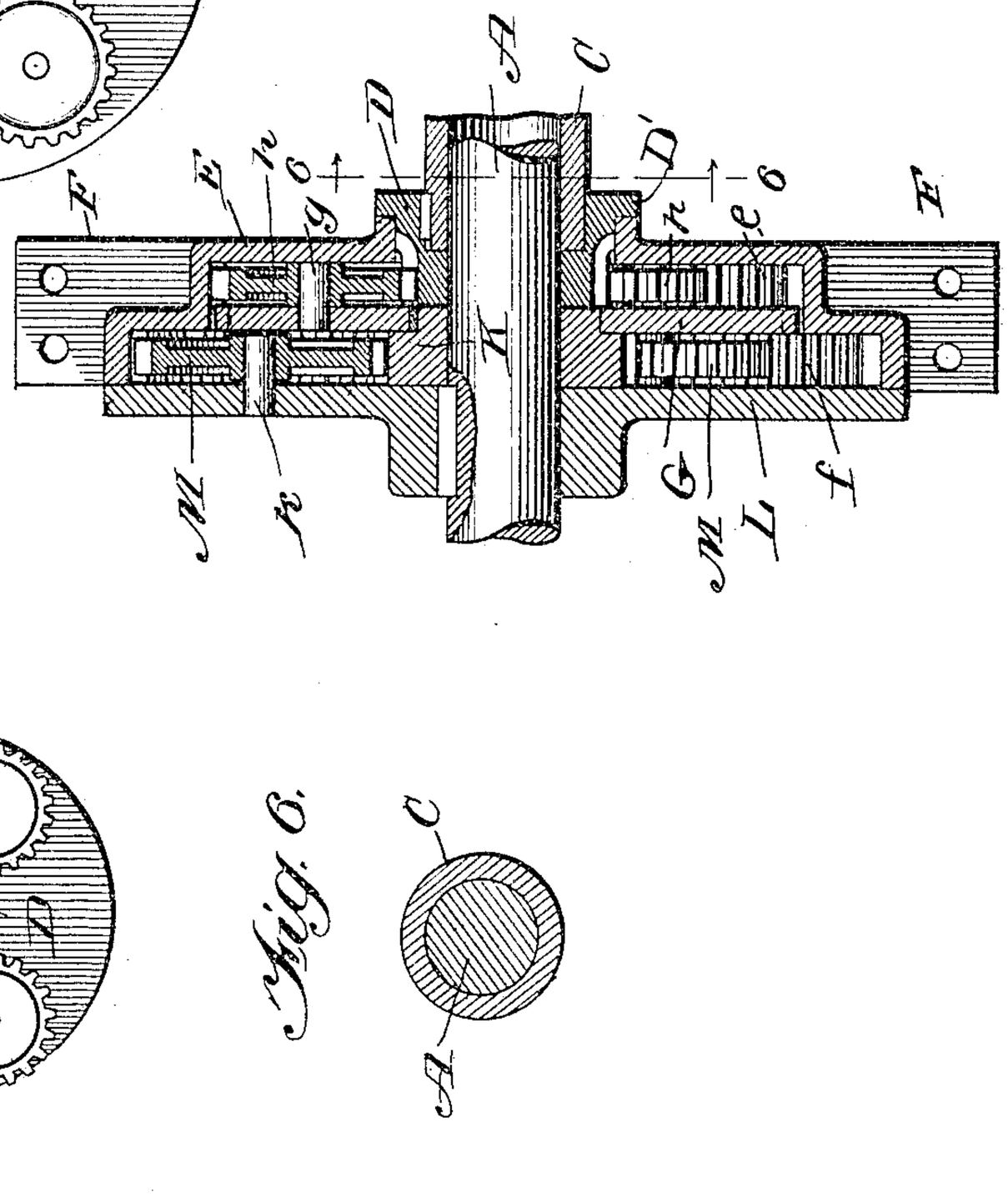

Fig. 5.

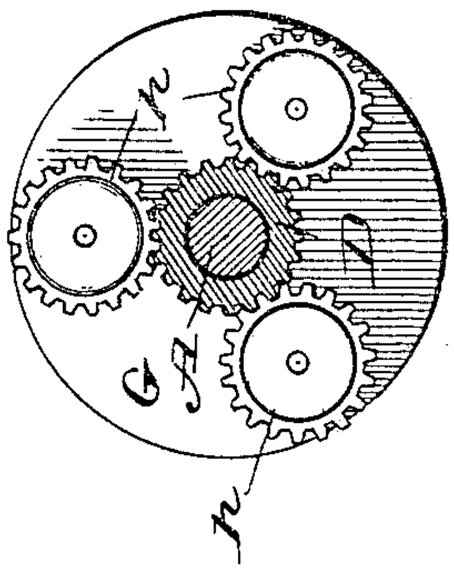

Fig. 6.

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UNITED STATES PATENT OFFICE.

JOSEPH G. O'KELLY, OF CHICAGO, ILLINOIS.

SPEED-REDUCING DEVICE FOR MOTORS OR DYNAMOS.

SPECIFICATION forming part of Letters Patent No. 793,218, dated June 27, 1905.

Application filed May 7, 1902. Serial No. 106,236.

To all whom it may concern:

Be it known that I, JOSEPH G. O'KELLY, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Speed-Reducing Devices for Motors or Dynamos, of which the following is a full, clear, and exact description.

The object of my invention is to dispense with the necessity of belting, gearing, and counter-shafts for reducing the high speed of dynamos and motors and to enable the same to be placed directly upon the shaft it is designed to drive.

My improvements are particularly designed for use in conjunction with electric-car motors and in connection with the power distribution of factories and industrial institutions, in which latter a large saving in the cost of installing the plant and a great economy of space is secured. This I accomplish by the means hereinafter fully described, and as particularly pointed out in the claims.

In the drawings, Figure 1 is a plan view of the drive-wheels of an electric car, showing my improvements secured on the axle thereof. Fig. 2 is a horizontal central section taken through the speed-reducing devices thereof drawn to a larger scale. Fig. 3 is a view of the circular plate, which is secured to the axle or shaft, looking at the broad side thereof, to which the idle wheels are journaled, and with the secondary king-gear and shaft in cross-section drawn to the same scale as Fig. 1. Fig. 4 is a side view of the stationary compound internal gear-casing looking into its interior and showing the axle or shaft in section. Fig. 5 is a view of the interior transmission-plate looking toward the broad side thereof next which the idle pinions are journaled and showing the primary king-gear and shaft or axle in section. Fig. 6 is a transverse section through the shaft or axle and the armature-sleeve of the motor, taken on dotted line 6 6, Fig. 2, looking in the direction indicated by the arrows.

In the drawings, A represents a car-wheel axle having suitable car-wheels *a a* on its ends, and B represents the stationary field of air-electric motor, the armature and commutator *b* of which are secured fast to a sleeve C, which is loosely journaled on the said axle between the car-wheels. The end of the sleeve C preferably opposite the commutator *b* has secured thereto and revoluble therewith a primary king-gear D. The diameter of the bore of this king-gear at one end is increased and is adapted to be slipped over the end of the sleeve C until the edges of the sleeve bear against the inner shoulder of the rabbet then formed; but the diameter of the remainder of the bore of said king-gear is such as to loosely fit the shaft or axle. The teeth of this gear D are made by moving the gear-cutter from the end thereof farthest from sleeve C toward but not clear to the opposite end. This leaves a cylindrical surface surrounding the sleeve C, which is rabbeted so as to leave a circumferential flange D'. Loosely seated in the rabbeted portion of this king-gear D in such manner as to easily revolve within the same is a stationary double internal gear-casing E. The circular exterior of this internal gear-casing E is stepped to two diameters, the portion having the smallest of which surrounds the king-gear D and is provided with an interior annular rack *e* and the portion having the greatest diameter of which extends in a direction opposite the motor and is provided with the interior annular rack *f*. This internal gear-casing E has screw-plates F F projecting radially from its periphery or is provided with any other suitable means for securing it to the adjacent structure of the trucks, in which said wheels are journaled, so as to hold the same stationary.

Loosely journaled on the axle or shaft A, so as to come within and be surrounded by the portion of the interior gear-casing E having the least diameter, is a transmission-plate G. This plate G has a series of pivotal studs *g* projecting therefrom toward the closed face of said casing, and loosely journaled on these studs *g* are idle gears *h*, which are of such diameter that they are engaged by the king-gear at points nearest the axle or shaft A and by the annular rack *e* of the stationary casing E diametrically opposite said king-gear D. Made integrant with the central portion of this plate G and extending in a direction op-

posite the gear D is a secondary king-gear K, the pitch of which is preferably greater in diameter than that of king-gear D, and secured to shaft A by a suitable spline or key or otherwise is a circular plate L, the outer portion of which bears against the annular edges of the portion of the interior gear-casing E having the greatest diameter, with which said plate preferably corresponds. This plate L has a series of pivotal studs *k* projecting therefrom toward plate G, and journaled on these studs are the idle pinions M, which are preferably greater in diameter than the pinions *h* and are engaged by the king-gear K on one side and by the interior annular rack *f* of the casing E diametrically opposite said king-gear.

The operation of my invention is as follows: The armature of the motor being secured to sleeve C revolves the same, together with the primary king-gear D attached thereto. This king-gear D engages the idle gears *h*, and as the idle gears engage the stationary interior annular rack *e* of the casing E the transmission-plate G is caused to revolve at a reduced speed as compared with king-gear D. The secondary king-gear K revolves at the reduced speed of the plate G, to which it is attached; and by engaging the pinion M the latter by engaging the stationary interior rack *f* causes the plate L, together with the axle or shaft A, to rotate at a speed much less than the king-gear K. This reduction of the speed of the armature-sleeve can be carried to a much greater extent simply by introducing additional transmission-plates similar to D, together with the elements coöperating therewith; but, if desired, such transmission-plate can be dispensed with altogether. All such modifications I desire to be considered as contemplated within the scope of my invention, the principal features of which are the sleeve to which the armature of the motor is fastened instead of a solid shaft and the speed-reduction devices arranged concentric to and upon the shaft or axle it is desired to actuate at a reduced speed by said motor.

What I claim as new is—

1. The combination with an axle or shaft, of a circular plate keyed thereto, a series of idle pinions carried by said plate, a king-gear on said shaft engaged by said idle pinions, an interior gear-casing inclosing and engaging with the outer segments of said idle pinions opposite said king-gear, and a sleeve loosely journaled on said axle or shaft and means for imparting the motion of said king-gear to said sleeve.

2. The combination with an axle or shaft, of a circular plate keyed thereto, a series of idle pinions carried by said plate, a king-gear on said shaft engaged by said idle pinions, an interior gear-casing inclosing and engaging with the outer segments of said idle pinions opposite said king-gear, and a sleeve loosely journaled on said axle or shaft and gearing for imparting the motion of said king-gear to said sleeve.

3. The combination with a motor and sleeve which is rotated thereby, of an axle or shaft upon which said sleeve is journaled, a king-gear secured concentrically to one end of said sleeve, a stationary casing having concentric internal annular racks, a transmission-plate loose upon said axle or shaft, and pinions carried thereby which are located between said king-gear and one of said internal racks and mesh therewith, and a plate secured to said shaft, which is operatively connected to said transmission-plate whereby said sleeve indirectly actuates said shaft at a reduced rate of speed.

4. The combination with a motor and sleeve which is rotated thereby, of an axle or shaft upon which said sleeve is journaled, a king-gear secured concentrically to one end of said sleeve, a stationary casing having concentric internal annular racks, a transmission-plate loose upon said axle or shaft, and pinions carried thereby which are located between said king-gear and one of said internal racks and mesh therewith, a secondary king-gear integrant with said transmission-plate, a plate secured to said shaft, and pinions carried thereby which mesh with said secondary king-gear and the internal rack in the same transverse plane thereas, whereby said sleeve indirectly actuates said shaft at a reduced rate of speed.

5. The combination with a motor and sleeve which is rotated thereby, of an axle or shaft upon which said sleeve is journaled, a king-gear secured concentrically to one end of said sleeve, a stationary casing having two concentric internal annular racks of different diameters, a transmission-plate loose upon said axle or shaft, and pinions carried thereby which are located between said king-gear and the internal rack of lesser diameter and mesh therewith, a secondary king-gear integrant with said transmission-plate, a plate secured to said shaft, and pinions carried thereby which mesh with said secondary king-gear and the internal rack of greater diameter in the same transverse plane thereas, whereby said sleeve indirectly actuates said shaft at a reduced rate of speed.

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