J. P. NIKONOW.

STARTING AND GENERATING MECHANISM.

APPLICATION FILED JAN. 7, 1914.

1,231,638.

Patented July 3, 1917.

Fig. 2.

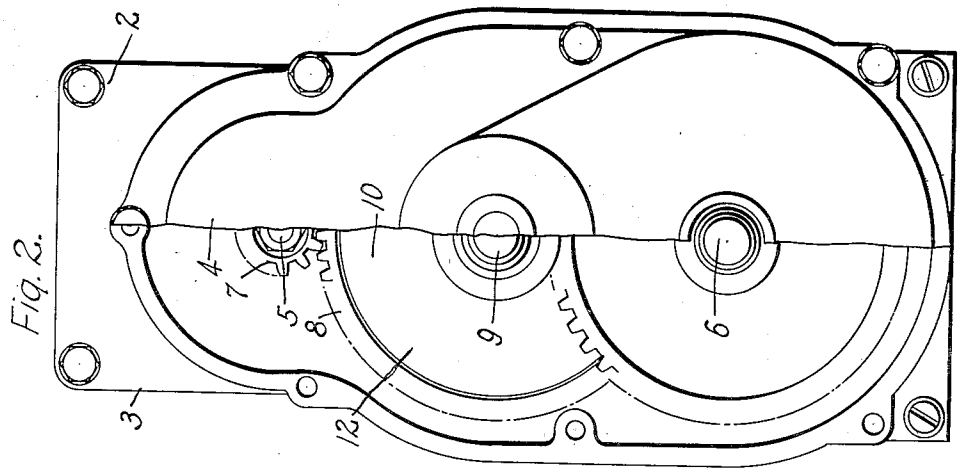
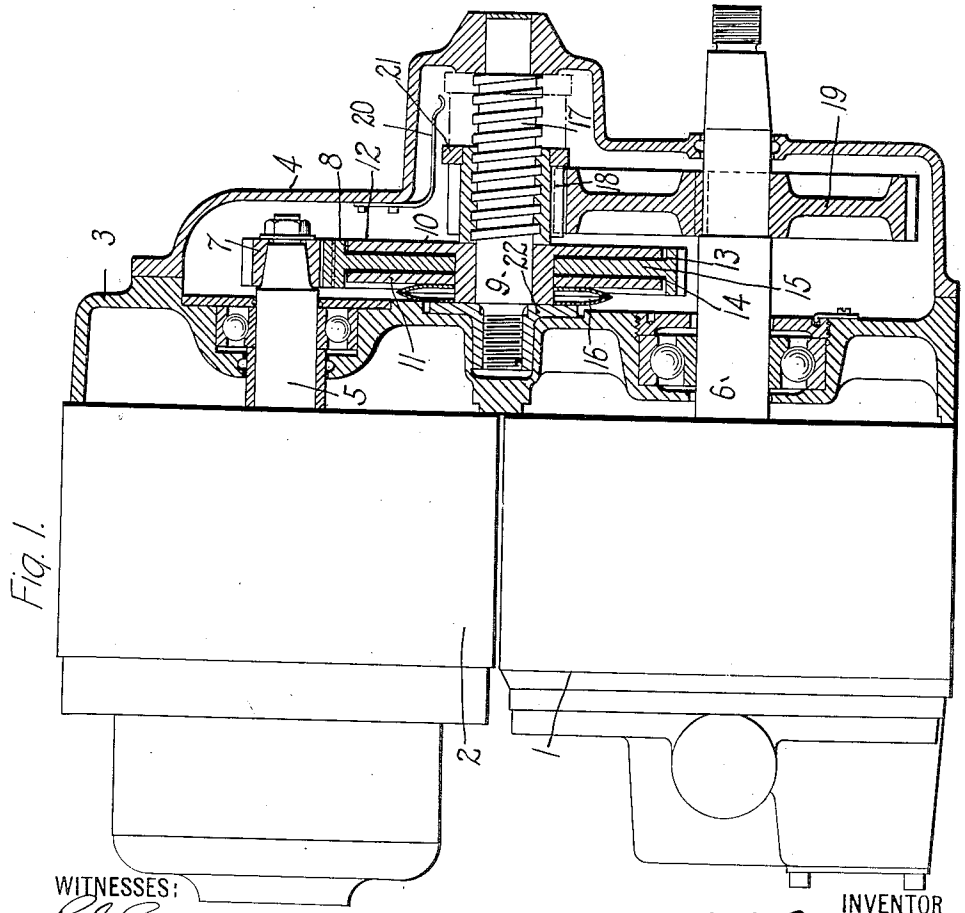


Fig. 1.



WITNESSES:

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JOHN P. NIKONOW, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

STARTING AND GENERATING MECHANISM.

1,231,638. Specification of Letters Patent. Patented July 3, 1917.

Application filed January 7, 1914. Serial No. 810,825.

To all whom it may concern:

Be it known that I, JOHN P. NIKONOW, a subject of the Czar of Russia, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Starting and Generating Mechanism, of which the following is a specification.

My invention relates to starting and generating mechanism, and it has particular reference to mechanisms embodying separate dynamo-electric machines for starting the engines of automobiles or other motor vehicles, and for supplying current for ignition and lighting systems and for charging storage batteries.

My invention has for its object to provide a mechanism of the character above indicated which is simple and compact in form and which operates automatically to start the engine of an automobile and to simultaneously furnish current for ignition.

It has been proposed, heretofore, to provide separate dynamo-electric machines for operation respectively as a motor and as a generator for the purpose above described. It is customary, in practice, to employ machines that are mechanically independent and that are mounted upon separate supporting members in definite positions relatively to the engine. This construction requires separate brackets for supporting the machines and separate trains of gear mechanism for connecting them to the engine shaft.

I have provided a mechanism in which a motor and a generator are electrically independent and are mechanically arranged to form a unitary structure. The motor shaft is automatically connected to the generator shaft when the motor circuit is closed, and it is, therefore, necessary to connect the generator shaft only to the engine shaft.

In the accompanying drawings, Figure 1 is a side view, partially in elevation and partially in section, of a mechanism arranged in accordance with my invention. Fig. 2 is an end view in elevation of the mechanism of Fig. 1, part of of the casing being broken away.

The mechanism comprises a generator 1, and a motor 2 that is supported upon the generator. The motor and the generator are held in rigid relation by an end casing 3 that is common to them and by a housing 4 which incloses a gear mechanism for connecting the motor shaft 5 to the generator shaft 6. A pinion 7, which is fixed upon the motor armature shaft 5, meshes with a gear wheel 8 that is yieldingly connected to the shaft 9 by means of a flanged collar member 10 and an annular disk 11. The flange 12 of the collar member 10 and the disk 11, which are provided with surfaces 13 and 14 of a suitable friction material, engage the web portion 15 of the gear wheel 8 with a force that is proportional to the pressure of a spring 16 that is mounted between the disk 11 and a collar member 22.

The shaft 9 is provided with a threaded portion 17 to coact with a pinion 18 that is mounted thereon. The pinion 18 is actuated longitudinally of the shaft 9 in opposite directions according as the pinion rotates faster or slower than the shaft. When the pinion 18 is at one limit of its path of movement, it is in mesh with a gear wheel 19 that is fixed to the armature shaft 6 of the generator 1. At the other limit of its path, the pinion 18 is disengaged from the gear wheel 19 and the armature shaft 5 and 6 are, therefore, disconnected. The pinion 18 is adapted to be drawn into mesh with the gear wheel 19 when the shaft 9 is rotated faster than the pinion 18 and to be disengaged therefrom when the speed of the pinion 18 exceeds that of the shaft. The armature shaft 6 may be connected in any suitable manner to the engine shaft of a gas engine (not shown).

It may be assumed that the pinion 18 occupies its dotted line position, Fig. 1, and that it is desired to start the engine. When the motor circuit is closed through any suitable electrical means (not shown), the armature shaft 5 is rotated in a clockwise direction, Fig. 2, and the shaft 9 will be rotated in the opposite direction by means of the pinion 7 and the gear wheel 8. By reason of the inertia of the pinion 18, the rotation of the threaded portion 17 of the shaft 9 will actuate the pinion 18 to the position shown in Fig. 1 to mesh the pinion with the gear wheel 19. The generator armature shaft 6 will then be rotated to start the gas engine to which it may be connected. When the gas engine starts under its own power, the shaft 6, the gear wheel 19 and the pinion 18 will be driven by the engine at a speed higher than that when driven by the motor

2. The speed of the pinion 18 now exceeds that of the shaft 9 and, as a result, it is actuated to the right by the threaded portion 17 to be disengaged from the gear wheel 19 and to again occupy its dotted line position. A spring 20 coacts with a flange 21 to yieldingly retain the pinion 18 in this position during the period in which it is coming to rest. The motor circuit will be opened by the operator as soon as the engine has started. The generator 1, which is connected to the engine at a fixed speed ratio, generates current which may be supplied to a storage battery for charging and to ignition and lighting systems (not shown).

The advantages of my invention are that, while separate units may be employed, they are combined in a unitary structure which may be assembled at the place of manufacture. Only the usual connection of the generator to the engine shaft is required. The operative connection of the motor to the generator is automatically controlled, thus avoiding any attention on the part of the operator to this portion of the operation.

I claim as my invention:

1. The combination with two dynamo-electric machines having integral frame members common to said machines, of automatic means comprising a longitudinally movable gear wheel for operatively connecting and disconnecting said machines.

2. The combination with a motor and a generator, of integral members common to said motor and to said generator to form a unitary structure, and means comprising longitudinally movable gear wheel for operatively connecting and disconnecting said motor and said generator according to predetermined conditions.

3. The combination with a motor and a generator, of reduction gear mechanism for operatively connecting said motor to said generator, said mechanism comprising a gear wheel, automatic means for controlling the position of said gear wheel, and coacting friction elements.

4. The combination with two dynamo-electric machines each comprising an armature shaft, of automatic means comprising a pair of coacting gear wheels and a screw-threaded shaft coacting with one of said gear wheels for operatively connecting said armature shafts when one machine is the driver and for disconnecting said shafts when the other machine is independently driven.

5. The combination with a motor and a generator, of means for operatively connecting said motor to said generator when the motor is the driver and for disconnecting the motor from the generator when the motor is driven from the generator shaft, said means comprising a pair of coacting gear wheels and means for actuating one of said gear wheels into and out of mesh with the other gear wheel.

6. The combination with two dynamo-electric machines having armature shafts, of automatic means for operatively connecting said armature shafts when one of said machines is the driver and for disconnecting said shafts when the other machine is independently driven, said means comprising a shaft having a threaded portion and a member coacting with said threaded portion.

7. The combination with two dynamo-electric machines having armature shafts, of automatic means for operatively connecting said armature shafts when one of said machines is the driver and for disconnecting said shafts when the other machine is independently driven, said means comprising a gear wheel, a shaft having a threaded portion and a pinion coacting with said threaded portion and said gear wheel.

In testimony whereof, I have hereunto subscribed my name this 31st day of Dec. 1913.

JOHN P. NIKONOW.

Witnesses:
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B. B. HINES.