No. 649,974. Patented May 22, 1900.

M. L. WHITFIELD.

DYNAMO ENGINE.

(Application filed Apr. 15, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1

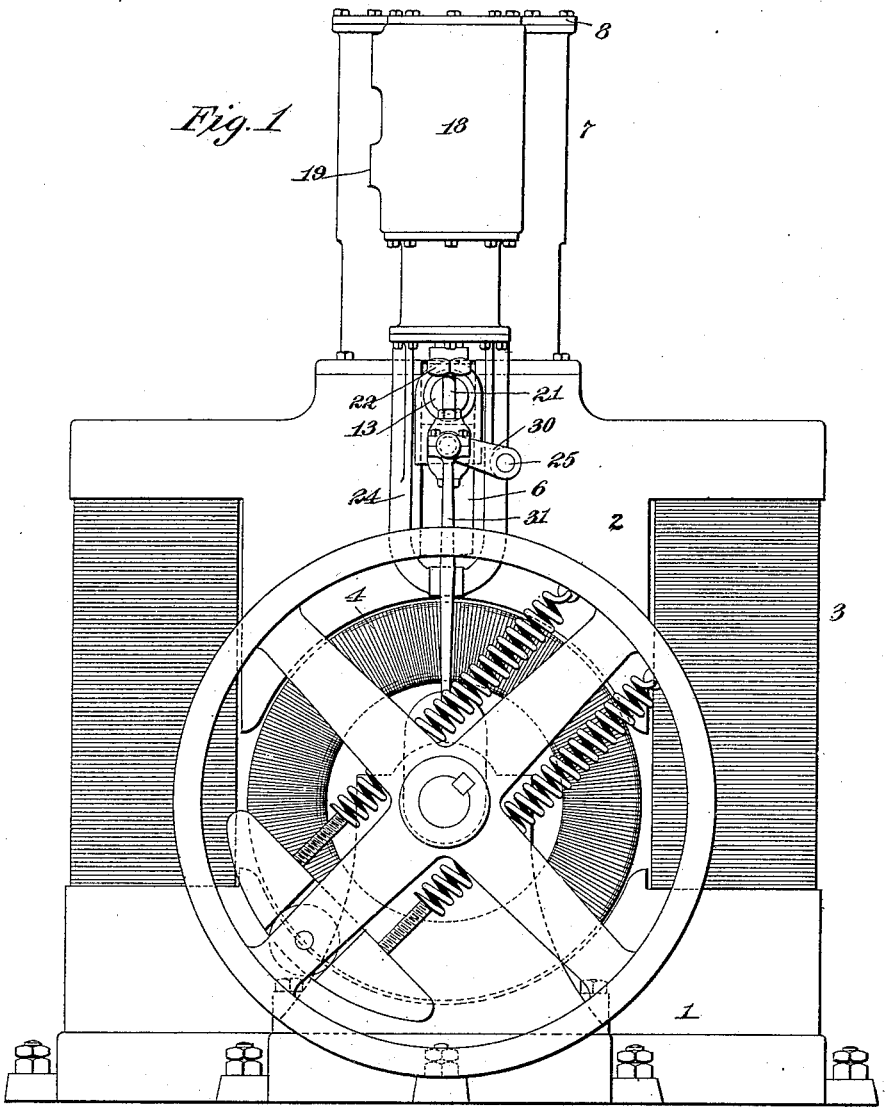

Fig. 5

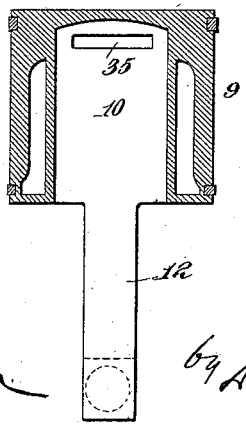

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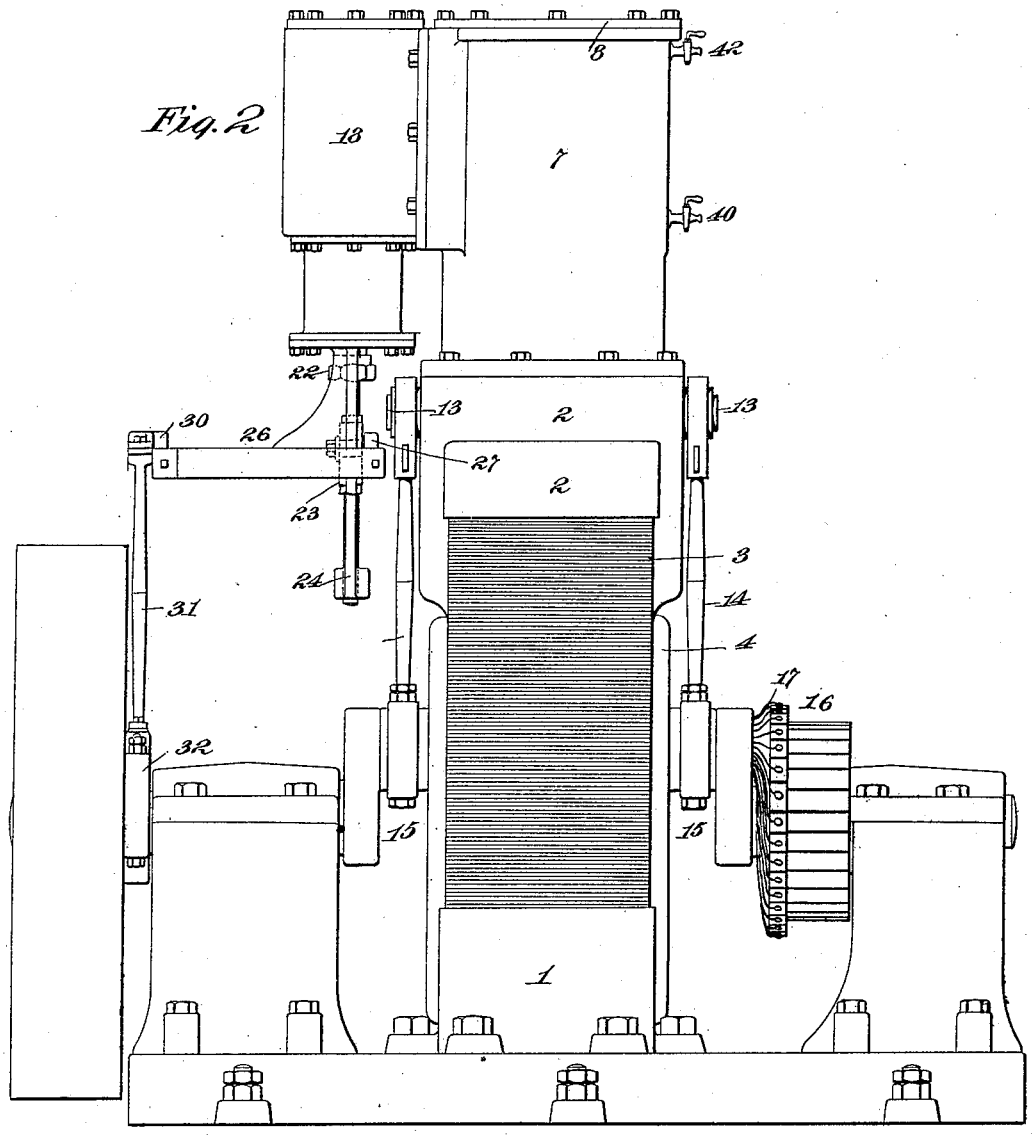
Fig. 2



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DYNAMO ENGINE.

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(No Model.) 3 Sheets—Sheet 3.

Fig. 3

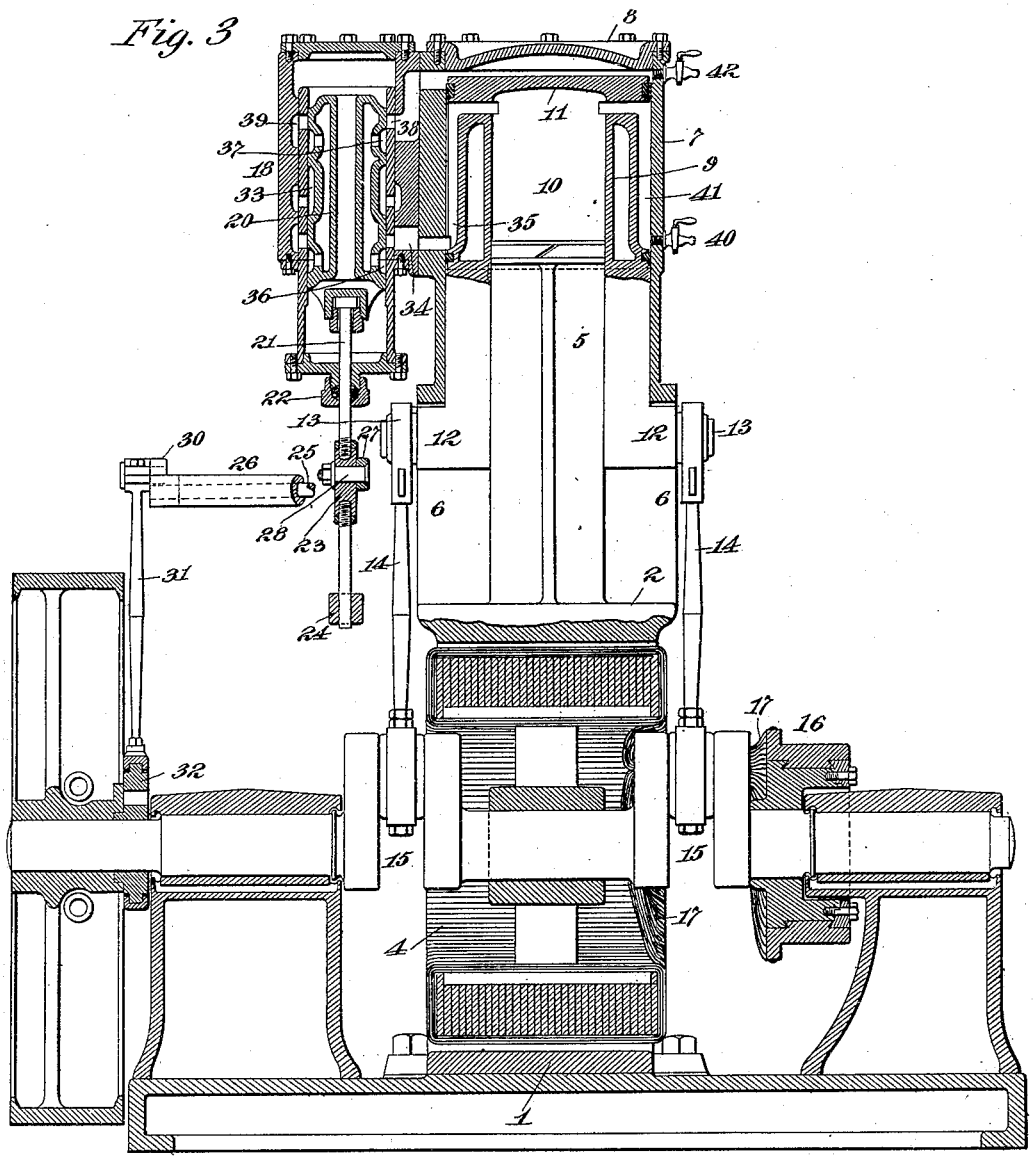
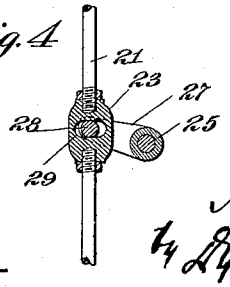


Fig. 4



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UNITED STATES PATENT OFFICE.

MARCY L. WHITFIELD, OF MEMPHIS, TENNESSEE, ASSIGNOR TO THE WHITFIELD COMPANY, OF SAME PLACE.

DYNAMO-ENGINE.

SPECIFICATION forming part of Letters Patent No. 649,974, dated May 22, 1900.

Application filed April 15, 1899. Serial No. 713,106. (No model.)

To all whom it may concern:

Be it known that I, MARCY L. WHITFIELD, a citizen of the United States, residing at Memphis, in the county of Shelby and State of Tennessee, have invented certain new and useful Improvements in Dynamo-Engines, of which the following is a specification.

My invention relates to various new and useful improvements in dynamo-engines; and the essential object of the invention is the production of a simple and efficient device of this type employing a compound engine of novel form. In effecting this object I employ a dynamo of any suitable variety and carrying directly upon one of its poles or upon the yoke connecting the poles an abutment with which coöperates a movable cylinder-piston, the latter constituting the high-pressure cylinder and the low-pressure piston. The high-pressure cylinder (hereinafter referred to as the "cylinder-piston") works over the abutment and within the low-pressure cylinder and connects by either one, but preferably two, driving-rods with the armature-shaft. Suitable valve mechanism is employed, operated from the armature-shaft and preferably through the instrumentality of a cut-off governor, whereby a practically-constant speed of rotation will be secured.

My special improvements relate principally to the construction of the compound engine, its combination with the dynamo to the regulating mechanism, and to the novel manner of effecting electrical connection between the commutator and the armature when a crank is located between such devices.

In order that my invention may be better understood, attention is directed to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a side view of my improved dynamo-engine; Fig. 2, an end view thereof, and Fig. 3 a vertical sectional view. Figs. 4 and 5 are enlarged detail views.

In all of the above views corresponding parts are represented by the same numerals of reference.

The dynamo which I show in the drawings is the common type, being provided with the two oppositely-disposed poles 1 2, energizing-coils 3 3, and armature 4. This dynamo may be effectively used in carrying out my present improvements, and it will be understood that other types of electrical generating devices may be employed. Mounted directly upon the dynamo is an abutment 5, generally cylindrical in shape. This abutment may be carried upon any stationary part of the dynamo—as, for instance, upon the pole 2, as shown. The pole-piece is cut away at each side to form a guide 6, and a low-pressure cylinder 7 is bolted to the upper face of the pole on either side of said guides, said cylinder having a removable head 8. Mounted within the low-pressure cylinder 7 and coöperating with the abutment 5 is a cylinder-piston 9, the cylinder portion 10 thereof constituting, with the upper end of the abutment 5, the high-pressure cylinder and the piston portion 11 thereof constituting the low-pressure piston. The cylinder-piston 9 is provided with two arms 12 12, to which the wrist-pins 13 are connected. Two drive-rods 14 transmit motion from the wrist-pins 13 to cranks 15 on the shaft of the armature 4. I prefer to arrange the cranks 15 15 when two are used as close to the armature as possible, and therefore place the commutator 16 on the outside of one of said cranks, the latter being located between the commutator and armature. In order that connections may be made between the commutator 16 and the armature-coils, I extend the connecting-wires 17 through a passage formed in the intermediate crank, as shown. Mounted at one side of the cylinder 7 is a valve-chest 18, having a steam-inlet port 19 in its side. A valve 20 reciprocates in the valve-chest, being operated from a stem 21, passing through a stuffing-box 22 and having a slide-head 23 at its lower end working in guides 24.

25 is a rock-shaft carried in a bracket 26, depending from the valve-chest, and 27 is an arm on said rock-shaft, having a pin 28, which engages a slot 29 in the head 23. The rock-shaft 25 carries an arm 30 at its opposite end, and a connecting-rod 31 operates this arm from an eccentric 32. The latter is provided with any desired form of centrifugal governor by which the cut-off of the engine will be varied to maintain the speed uniform. I illustrate a cut-off governor of the common

form. The live-steam port 19 to the valve-chest connects at all times with a pocket 33 in the valve 20, which pocket is adapted to be put into communication with a port 34 in the walls of the low-pressure cylinder. The cylinder-piston 9 is provided with a pocket 35, which is at all times in communication with the port 34 to convey steam to or from the high-pressure cylinder 10. The valve 20 is also provided with connected pockets 36 and 37, adapted to register, respectively, with the port 34 and a port 38 when expansion of steam is to be maintained from the high to the low pressure cylinders. When the valve 20 is at its extreme lower position, the port 38 will be put in communication with an exhaust-port 39 to allow for the exhaust from the high-pressure cylinder. Usually a petcock 40 is secured to the cylinder 7, so as to effectively drain the high-pressure cylinder 10. This petcock connects with a pocket 41, formed in the cylinder-piston diametrically opposite the pocket 35, so as to effectively counterbalance the cylinder-piston. The pocket 41 connects at its upper end with the cylinder 10, as will be noted, whereby when the cylinder-piston is depressed the water of condensation in the cylinder 10 will flow into the pocket 41 and be drained off through the petcock 40. For a similar purpose the low-pressure cylinder is also preferably provided with a petcock 42, by which it may be drained.

My improved device operates as follows: Steam being supplied to the inlet-port 19 will pass by the port 34 and pocket 35 into the high-pressure cylinder 10. Working against the abutment 5, the steam elevates the cylinder-piston and, through the wrist-pins 13 and drive-rods 14, starts the rotation of the armature-shaft. In this motion the valve 20 is elevated to communicate the pockets 36 and 37 with the ports 34 and 38, respectively. This cuts off the live steam from the engine and allows the steam from the high-pressure cylinder to expand through the pocket 35, port 34, pockets 36 and 37, and port 38 into the low-pressure cylinder, depressing the cylinder-piston and completing the return stroke of the armature-shaft. When the valve again descends to connect the live-steam inlet with the high-pressure cylinder, the port 38 will be placed in communication with the exhaust 39, allowing for the exhaust. Obviously the valve 20 is operated by the rotation of the armature-shaft through the eccentric 32, connecting-rod 31, rock-shaft 25, and valve-rod 21.

My device, it will be noted, is very simple and compact in construction. Practically all stuffing-boxes are avoided and high efficiency is effected.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a dynamo-engine, the combination with a dynamo, of a stationary abutment carried by the field-magnet thereof, a low-pressure cylinder, a high-pressure cylinder-piston in said low-pressure cylinder and coöperating with said abutment, and connections with the cylinder-piston for operating the dynamo-armature, substantially as set forth.

2. In a dynamo-engine, the combination with a dynamo, of a stationary abutment carried by the field-magnet thereof, a low-pressure cylinder also carried by said dynamo, a high-pressure cylinder-piston in said cylinder and coöperating with said abutment, and connections between the cylinder-piston and dynamo-armature, substantially as set forth.

3. In a dynamo-engine, the combination with a dynamo, of a stationary abutment carried by the field-magnet thereof, a low-pressure cylinder also carried by said dynamo and mounted concentric to said abutment, a high-pressure cylinder-piston in said cylinder and coöperating with said abutment, and connections between said cylinder and the dynamo-armature, substantially as set forth.

4. In a dynamo-engine, the combination with a dynamo, of a stationary abutment carried by the field-magnet thereof, a low-pressure cylinder, a high-pressure cylinder-piston in said cylinder and coöperating with said abutment, connections between the cylinder-piston and the armature, a valve mechanism, and connections between the valve mechanism and the dynamo-armature, substantially as set forth.

5. In a dynamo-engine, the combination with a dynamo, of a stationary abutment carried by the field-magnet thereof, a low-pressure cylinder, a high-pressure cylinder-piston in said cylinder and coöperating with said abutment, connections between the cylinder-piston and the armature, a valve mechanism, connections between the valve mechanism and the dynamo-armature, and a cut-off governor for operating said valve mechanism, substantially as set forth.

6. In a dynamo-engine, the combination of a dynamo, of a stationary abutment carried by the field-magnet thereof, a low-pressure cylinder, a high-pressure cylinder-piston mounted in said cylinder and coöperating with said abutment, wrist-pins carried by said cylinder-piston, and a plurality of drive-rods connecting said wrist-pins and the dynamo-armature, substantially as set forth.

7. In a dynamo-engine, the combination with a dynamo, of a stationary abutment carried by the field-magnet thereof, a low-pressure cylinder also carried by said dynamo, a high-pressure cylinder-piston mounted in said cylinder and coöperating with said abutment, wrist-pins connected to said cylinder-piston, and a pair of drive-rods connecting said wrist-pins with the dynamo-armature, substantially as set forth.

8. In a dynamo-engine, the combination with a dynamo, of a stationary abutment carried by the field-magnet, a low-pressure cylinder mounted on said field-magnet, a high-pressure cylinder-piston mounted in said

cylinder and coöperating with said abutment, a valve for said engine, a valve-rod for operating said valve, a rock-shaft, connections between said rock-shaft and the valve-rod, and connections between said rock-shaft and the armature-shaft, substantially as set forth.

9. In a dynamo-engine, the combination with a dynamo, of an engine carried thereby, a valve-chest carried by and exteriorly of the engine-cylinder, a slide-valve in said chest for controlling said engine, a valve-rod for operating said valve, a slide-head on said valve-rod, a rock-shaft, an arm thereon carrying a pin engaging a slot in said slide-head, and a second arm on said rock-shaft connected to the dynamo-shaft, substantially as set forth.

10. In a dynamo-engine, the combination with a dynamo, its armature and armature-shaft; of a compound engine for operating said dynamo connected with a crank on said armature-shaft, a commutator for the armature on the outside of said crank, and electrical connections from the commutator to the armature-coils extending through the crank, substantially as set forth.

11. The combination of a stationary abutment, a low-pressure cylinder, a high-pressure cylinder-piston working in said low-pressure cylinder and on said abutment, said cylinder-piston having a peripheral pocket extending lengthwise thereof and opening into it at its inner end, and means for draining said pocket, substantially as and for the purpose set forth.

12. The combination of a stationary abutment, a low-pressure cylinder concentric thereto, a high-pressure cylinder-piston working in said low-pressure cylinder and on said abutment, said cylinder-piston having two peripheral pockets diametrically opposite each other and communicating with the interior thereof at one end, means for establishing communication through one of said pockets with the source of live-steam supply and with the low-pressure cylinder respectively, and means for draining the other pocket, substantially as and for the purpose set forth.

13. The combination of a stationary abutment, a low-pressure cylinder concentric thereto, a high-pressure cylinder-piston mounted in said low-pressure cylinder and coöperating with said abutment, a steam-port for conveying steam to and from the cylinder-piston, a pocket in the cylinder-piston in constant communication with said port, and a counterbalanced pocket in the cylinder-piston diametrically opposite to the first-mentioned pocket, substantially as set forth.

This specification signed and witnessed this 20th day of March, 1899.

MARCY L. WHITFIELD.

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