(No Model.) 2 Sheets—Sheet 1.

V. POPP.

REGULATION OF DYNAMOS DRIVEN BY COMPRESSED AIR.

No. 456,593. Patented July 28, 1891.

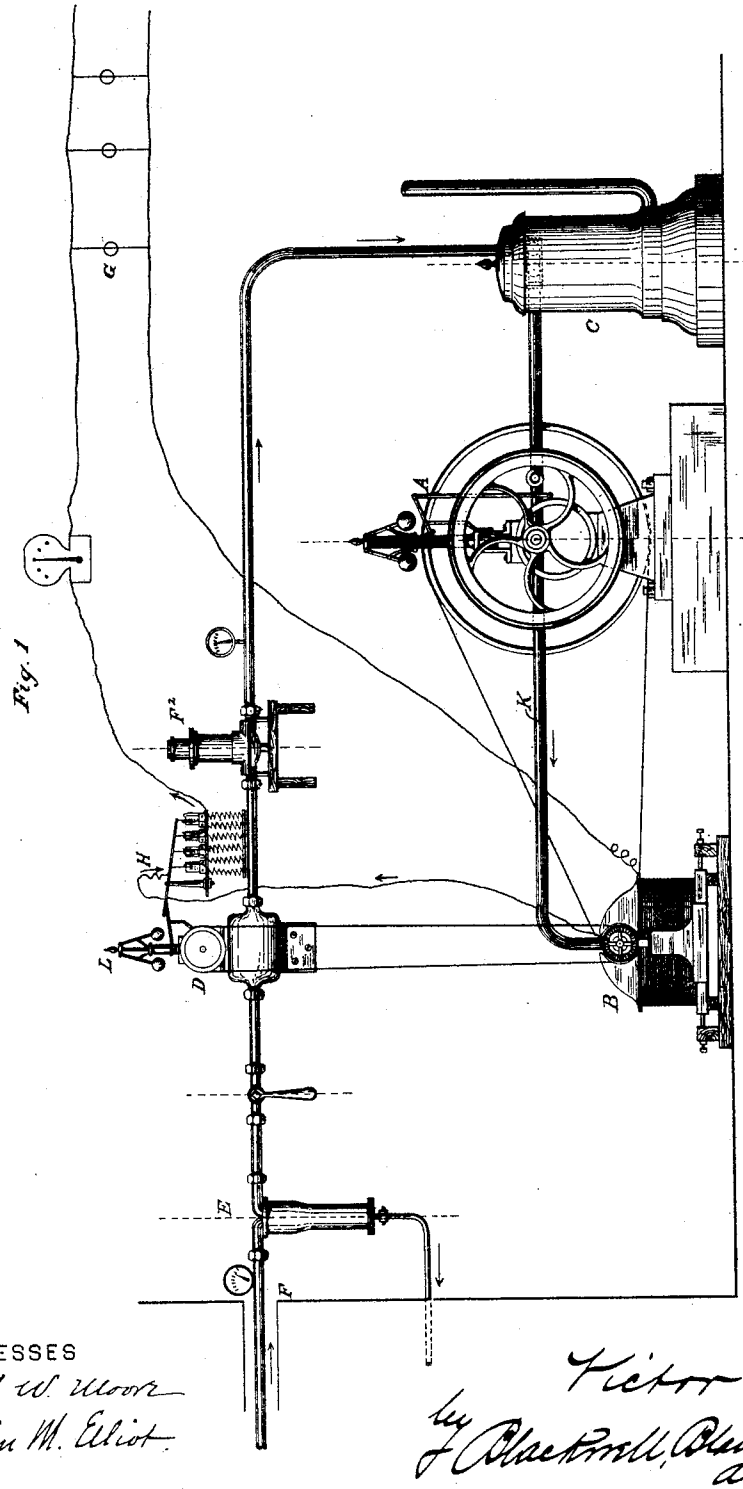

Fig. 1

WITNESSES

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Fig 2

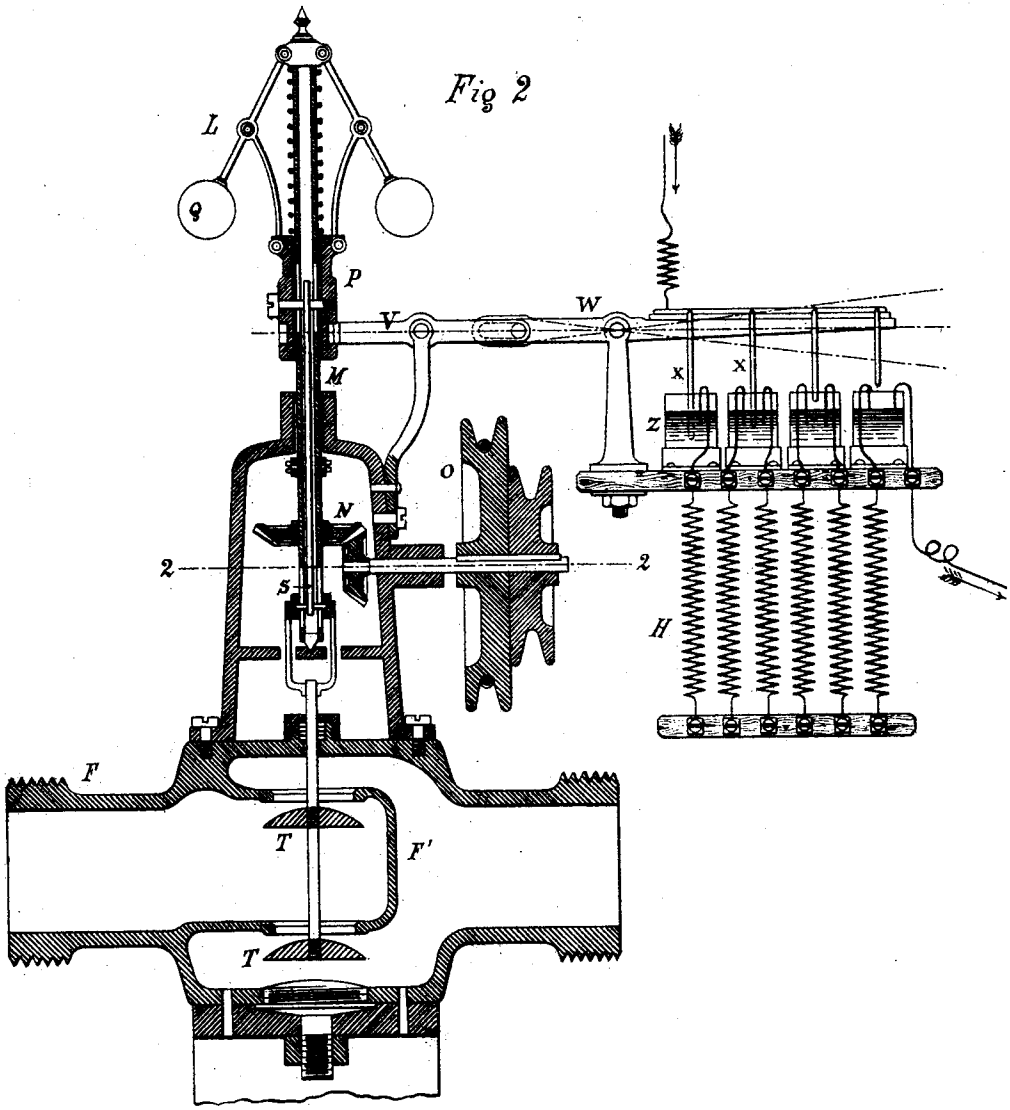
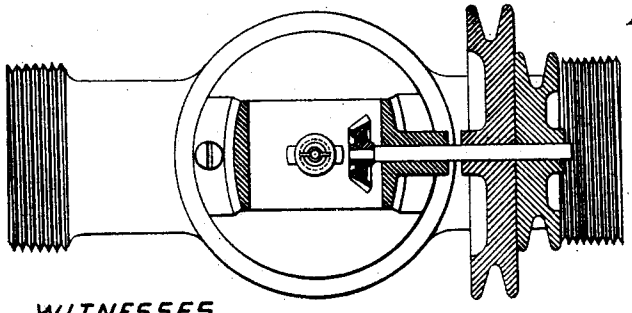


Fig 3



WITNESSES.
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UNITED STATES PATENT OFFICE.

VICTOR POPP, OF PARIS, FRANCE, ASSIGNOR TO THE POPP COMPRESSED AIR AND ELECTRIC POWER COMPANY, LIMITED.

REGULATION OF DYNAMOS DRIVEN BY COMPRESSED AIR.

SPECIFICATION forming part of Letters Patent No. 456,593, dated July 28, 1891.

Application filed April 7, 1888. Serial No. 269,983. (No model.) Patented in France November 7, 1887, No. 186,823; in Belgium May 7, 1888, No. 81,725, and in Italy June 30, 1888, XLVI, 247.

To all whom it may concern:

Be it known that I, VICTOR POPP, a citizen of the Republic of France, residing at the city of Paris, France, have invented certain new and useful Improvements in Regulation of Dynamos Driven by Compressed Air, (for which I have obtained Letters Patent in France dated November 7, 1887, No. 186,823; in Belgium dated May 7, 1888, No. 81,725, and in Italy dated June 30, 1888, XLVI, 247,) of which the following is a specification.

My invention relates to a method of operating dynamo-electric machines from a system of compressed-air distribution; and it consists in an arrangement by which a common regulation of the dynamo and its driving-engine is effected.

It furthermore consists in a specific arrangement of the devices essential to the perfect admission and registration of the compressed air.

It also consists in a device for cooling the dynamo by means of the exhaust-air from the engine.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is an elevation of the apparatus with a diagram of the electric circuit. Fig. 2 is a detail view in a vertical section of the regulating apparatus, and Fig. 3 is a section on the line 2 2 of Fig. 2.

In Fig. 1, F represents an inlet-pipe for a system of compressed-air distribution, which enters the building or locality in which the apparatus is situated. Upon entering the air passes first to a drain or siphon E of ordinary construction, where it is relieved of any moisture which it may contain. From E it passes to the automatic pressure-regulator D, thence to the meter F^2, thence to the heater C, and from the heater it passes into the rotary engine A. B is a dynamo-electric machine driven by a belt from the engine A. G represents electric lamps or other translating devices in the circuit of the dynamo. The exhaust-pipe K from the engine leads to a point directly over the armature of B, so that the exhaust-air may be delivered onto the machine for the purpose of keeping it cool during operation. L is a centrifugal governor driven by a belt from the dynamo B. This governor acts upon a balanced valve in the inlet-pipe F and also upon an artificial resistance H in the dynamo-circuit.

The details of the governor will be seen by reference to Fig. 2. M represents a hollow shaft driven by the beveled gears N, which in turn are actuated by pulley O, which receives a belt from the dynamo B. L is the centrifugal governor, having weights Q, which rotate with shaft M and act by their speed to raise or lower the sleeve P, which by means of the rod S in the shaft M is connected with the valve-plugs T T. The pipe F at this point has an enlargement which embraces the part F′, in the opposite sides of which are holes forming seats for the plugs T T. It will be seen that by means of the double plugs T T the valve is completely balanced. The incoming air acting upon the opposite faces of the two plugs, its tendency to produce motion in the valve is neutralized, and the action of the governor upon the valve is unaffected by the air-pressure. V is a lever, one end of which rests in a groove in sleeve P, so as to be actuated by its rise or fall. The opposite end of lever V engages with a slot in a second lever W, which has a number of platinum wires X of different lengths depending therefrom. These wires dip into corresponding mercury-cups Z, connected, respectively, with resistance-coils H.

In operation the engine drives the dynamo for the lights at a speed which tends to increase as the load of lamps upon the dynamo is decreased. This affects the governor L, which, as the speed increases, tends to lift sleeve P, which both closes the valve and also lifts the platinum points from the mercury-cups in succession until a part of the resistance H is inserted in the main circuit of the dynamo. On the other hand, should there be an increase in the load on the dynamo, there would be a reverse action of the regulating devices. By this means a perfect regulation of the apparatus under varying loads is effected.

I have found it necessary in practice that a drainage apparatus E should be placed in the circuit of the air before it reaches the

automatic pressure-regulator D or the meter F^2. I have also found that for correct registering the meter F^2 should be placed at a point in the air-circuit between the automatic regulator and the engine. My method of regulation of the compressed-air engine can also be applied to steam or other analogous motors, there being in all cases a simultaneous regulation of the actuating-fluid and of the electrical conditions.

I am aware that in compressed-air drills the exhaust-air has been directed against the drill to keep it cool and remove the cuttings, but I am not aware that prior to my invention exhaust-air from a pneumatically-driven machine has been directed against the machine itself, and in the case of a dynamo-electric machine a result is secured which cannot be found with any mechanism of a different character. That result is that, since the resistance of the machine increases rapidly with the temperature, its efficiency is greatly reduced as it becomes hot, and my invention overcomes this unfavorable phenomenon by keeping the machine at an extremely low temperature, by which a degree of efficiency is secured quite in advance of that attained when the dynamo is operated at the normal temperature. I believe I am the first one to operate a dynamo-electric machine under the conditions of extremely low temperature, and therefore desire to cover this feature by my claims.

I claim—

1. For supplying electricity from a general system of compressed-air distribution, the combination of an inlet-pipe F, leading immediately to a drain or siphon, a combined air and electrical automatic regulator placed along said pipe at a point beyond the siphon, a heater for the compressed air, a meter placed between the regulator and the heater, a motor operated by the air after passing the heater, and a dynamo-electric machine driven by said motor and having its output controlled by said automatic regulator.

2. The combination, with a dynamo-electric machine, of a compressed-air motor driving the same, and a pipe leading from the exhaust of said motor and directed against the dynamo, whereby the dynamo may be cooled by the direct action of the exhaust-air.

VICTOR POPP.

Witnesses:
ROBT. W. BLACKWELL,
G. RENAULT.