(No Model.)

F. E. KINSMAN.

AUTOMATIC OPERATION OF ELECTRIC GENERATORS.

No. 562,541. Patented June 23, 1896.

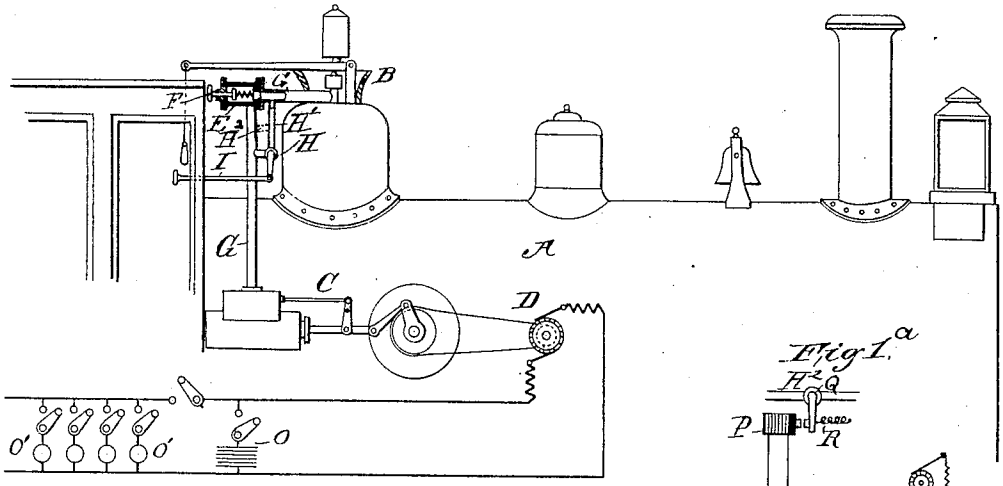

Fig. 1.

Fig. 1ª

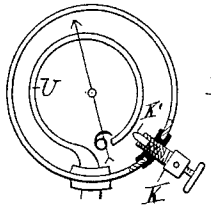

Fig. 2ª

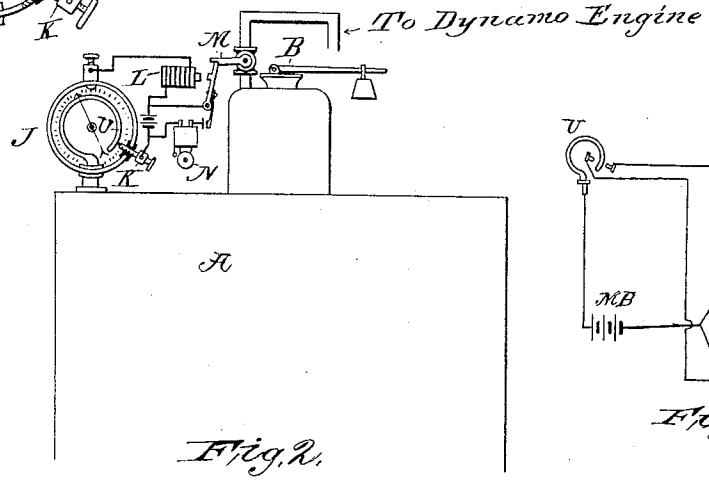

Fig. 2.

Fig. 3.

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UNITED STATES PATENT OFFICE.

FRANK E. KINSMAN, OF PLAINFIELD, NEW JERSEY.

AUTOMATIC OPERATION OF ELECTRIC GENERATORS.

SPECIFICATION forming part of Letters Patent No. 562,541, dated June 23, 1896.

Application filed June 23, 1893. Serial No. 478,564. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. KINSMAN, a citizen of the United States, and a resident of Plainfield, in the county of Union and State of New Jersey, have invented a certain new and useful Automatic Operation of Electric Generators, of which the following is a specification.

My invention relates to automatically-operated engine-generators, and especially to such operation of the generators carried upon railway-trains for general train-service, such as lighting and signaling.

The object of my invention is to provide a means whereby the steam-power which would otherwise go to waste when the pressure reaches a point above that required for the normal load, or a point at which the safety-valve would blow, may be utilized or conserved.

The invention is applicable to either stationary or locomotive engines, but is especially useful in connection with locomotive-engines, as it furnishes a means whereby steam-power which has heretofore been wasted every time the safety-valve operates may be utilized wholly or partially in lighting the cars. I do not wish to be understood, however, as limiting myself to the employment of the conserved energy for lighting, nor to the use of the apparatus in connection with locomotives.

The invention consists, essentially, in the combination, with a boiler and engine, of a dynamo, an engine for driving the same, a storage battery, and means for automatically turning the steam-pressure into the said driving-engine when the boiler-pressure reaches a predetermined point or a pressure above the normal working pressure.

As applied to a locomotive-boiler, the automatic devices are preferably set to turn the steam into the dynamo-engine when the pressure reaches about that at which the safety-valve would blow, but might be set at a lower pressure, especially when the work required of the locomotive at no time reaches nearly to the safety-pressure.

In utilizing the invention for lighting cars, I prefer to combine a storage battery with the lighting-mains in such manner that the stored energy of the dynamo in said battery may be used for running the lights when the dynamo is not operating.

As is well known, stationary boilers are frequently run with a load which does not require a boiler-pressure anywhere near approaching the safety limit or capacity of the boiler. In such case the automatic devices would be set to turn the steam into the dynamo-engine when the pressure goes beyond the normal working pressure.

Another feature of my invention consists in the combination, with the dynamo-engine and the automatic devices for turning steam into the same on the attainment of a predetermined pressure, of a by-pass valve adapted to be operated by hand, whereby the engine may be run at will from the main boiler, and even though the pressure may not be over that required for normal working.

As a means of bringing the dynamo-engine into operation automatically, any devices responsive to steam-pressure and set to the proper degree may be used for opening the connection. An obvious means would be a safety-valve whose vent is connected with the dynamo-engine; or, if desired, any ordinary steam-gage or device weighing the boiler-pressure might be used to close the circuit of an electromagnet which would in turn operate or let off the throttle of the dynamo-engine. I do not, however, limit myself to these special arrangements.

For a description of the application of my invention reference is had to the accompanying drawings, which form a part of this specification, and in which like reference-letters indicate like parts.

Figure 1 indicates the adaptation of the invention to a locomotive. Fig. 1ª is a modification thereof. Fig. 2 represents it as applied in a modified manner to any steam-boiler. Fig. 2ª shows a detail thereof; and Fig. 3 is a modification of the valve-operating device.

A represents the boiler with its steam-dome and the usual safety-valve B.

C represents a small supplemental engine of any type capable of operating a dynamo, such dynamo being indicated at D. The supplemental or dynamo engine and the dynamo may obviously be located in any convenient place on the locomotive or even on the tender.

For the purpose of operating the dynamo-

engine by the surplus steam, various connections between it and the boiler may be devised. An automatic valve may be employed which will operate at the ordinary blow-off pressure or which may be set to operate at a considerably lower pressure. One form of such valve is indicated at E, Fig. 1. The valve is held to its seat by a coiled spring and the tension of this spring is regulable by means of the screw F, so that the degree of pressure at which the valve E shall operate may be determined by the engineer. When the pressure reaches the predetermined point, the valve E will be opened and the escaping steam will pass through pipe G to the engine C, and the dynamo will be thereby operated until the pressure has fallen sufficiently to allow the valve to close. When the locomotive is to be at rest for any considerable time, the steam which at present gradually becomes dissipated may be utilized to operate the dynamo-engine. To provide for this, I insert a manually-controlled by-pass valve in a pipe connecting said engine to the boiler. Such valve is indicated at H as placed in a short pipe H′, connecting the two branches of pipe G. A rod I is attached to the lever of said valve for operating it. By this means the engineer may run the dynamo when there is not sufficient pressure of steam to open the automatic valve.

The supplemental engine might be connected directly to the discharge-port of the safety-valve, but it is preferred to make the connection substantially as shown and leave the safety-valve to operate as usual in case the automatic valve or the by-pass does not afford sufficient means of escape for the surplus steam.

The automatic valve, which may be considered the throttle for the dynamo-engine, may be operated in other automatic ways than those wherein the steam operates directly on the valve—as, for instance, by the electric current from the storage battery O, when it falls below the pressure required to operate the lamps or other apparatus supplied with current therefrom. This may be accomplished, as indicated in Fig. 1ª, by inserting a magnet P in a high-resistance connection between the mains and so locating this magnet that it shall operate upon the lever of a valve Q, located in a pipe, as H^2, which may connect the pipe H′ with the pipe G, as indicated in dotted lines in Fig. 1. This lever is normally held up by the magnet, but when the battery runs down the spring R draws said lever over and opens the valve. When the dynamo has been operated long enough to sufficiently raise the strength of the storage-battery, the magnet will close the valve P.

The automatic valve may be operated in another way. To an ordinary steam-gage, typified at J, may be joined an electric circuit, one terminal of which is connected directly to the case of the gage and the other to a binding-post K, which passes through a bushing of insulation and terminates near the end of the flexible member of the gage. The set-screw K has its shank screw-threaded, so that its point may be placed at a greater or less distance from said flexible member. This adjustment provides for varying the degree at which the electric circuit shall be closed. In said circuit is a magnet L, whose armatures prop up the stem of the automatic valve-throttle M, which is located in the pipe leading to the dynamo-engine. The screw K may be adjusted to close the circuit at the degree at which the safety-valve B would open, or it may be adjusted to close said circuit at a given point or degree therebelow or at a few degrees above the normal working pressure. This screw K, as shown in Fig. 2ª, is provided with a spring-seated pin K′, so as to allow the gage to respond to any increase of pressure beyond the degree at which the circuit is closed. When the circuit is closed, the magnet attracts its armature, the valve opens, and the dynamo-engine operates until the pressure has been sufficiently reduced, when the armature will fall back and in so doing may sound an alarm of any convenient form—such, for instance, as that indicated at N. The engineer will then lift the stem of the valve, which is notched at its outer end, and prop it up by placing the end of the armature in said notch.

The automatic throttle may be controlled in still another way, as indicated in Fig. 3. A magnet S may be placed on one side of the stem of valve M, so as to open it when the gage indicates a certain pressure, and another magnet T may be placed on the other side of said stem, so as to close the valve when the gage indicates that the pressure has fallen to a certain degree. To accomplish this, the flexible member U of the gage is connected to one pole of the battery M B, and to the other pole the two magnets are connected, the other connection from said magnets being made, respectively, to a front and back stop for said flexible member. In this construction also the stops or contacts may be constructed as seen in Fig. 2ª, if desired.

The current generated by the dynamo may be utilized for any purpose whatever to which a source of electricity carried on a train or elsewhere is adapted. It can be most advantageously used in connection with a storage battery. In Fig. 1 I have indicated the utilization of the current in train-lighting, O representing the storage battery and O′ the lights. It may also be used for train signaling systems independently of or in connection with the lighting system.

I have simply outlined a general plan for the utilization of surplus steam. This plan is subject to many modifications, and the apparatus and details thereof which have been indicated in the illustration may be greatly varied without departing from the spirit of my invention.

What I claim as my invention is—

1. The combination of a boiler, a dynamo-

engine, a dynamo, driven thereby, a passage between the boiler and engine containing a valve, and means for automatically opening said valve to supply steam to the engine when the steam reaches a predetermined degree of pressure, and automatically closing it when the pressure drops below said degree.

2. The combination, for train-lighting, of a locomotive-boiler, a supplemental engine, a dynamo, and devices responsive to a predetermined pressure for connecting the dynamo-engine and boiler, substantially as and for the purpose set forth.

3. The combination, for train-lighting, of a locomotive-boiler, a supplemental engine, a dynamo operated thereby, devices responsive to a pretermined pressure for connecting the dynamo-engine and boiler, and a storage battery, as and for the purpose set forth.

4. The combination of a locomotive-boiler, a dynamo and engine for operating the same and an interposed valve set to open connection therebetween at ordinary blow-off pressure, as and for the purpose set forth.

5. The combination, of a locomotive-boiler, a dynamo and engine for operating the same, an interposed valve set to open connection therebetween at the ordinary blow-off pressure, and a train-lighting system operated by the dynamo, substantially as described.

6. The combination, of a boiler, a dynamo-engine, devices responsive to a predetermined pressure for connecting the dynamo-engine and boiler, and a by-pass valve adapted to be operated by hand whereby said engine may be run at will, as and for the purpose set forth.

7. The combination, of a boiler, provided with the ordinary safety-valve, an automatic valve, a supplemental engine connected to the boiler through said automatic valve, and a manually-operated by-pass valve also controlling the connection between the boiler and the supplemental engine, substantially as set forth.

8. The combination, of a boiler, provided with the usual safety-valve, an automatic valve, a supplemental engine controlled by said automatic valve, an electric circuit containing mechanism for actuating the automatic valve, a steam-gage, and an adjustable circuit-controlling connection between said circuit and gage, as and for the purpose set forth.

9. The combination of a boiler, a supplemental engine, a dynamo operated thereby, an automatic valve in a connection between said boiler and engine, a storage battery, and a device connected to said battery for operating the automatic valve when the battery has run down.

10. The combination of a boiler, a supplemental engine, a dynamo operated thereby, an automatic valve in a connection between the boiler and engine, a storage battery and a magnet in a high-resistance connection between the feeders of the battery for operating upon said automatic valve when the battery runs down.

Signed at New York, in the county of New York and State of New York, this 21st day of June, A. D. 1893.

FRANK E. KINSMAN.

Witnesses:

WM. H. CAPEL,

T. F. CONRED.