

No. 661,545.

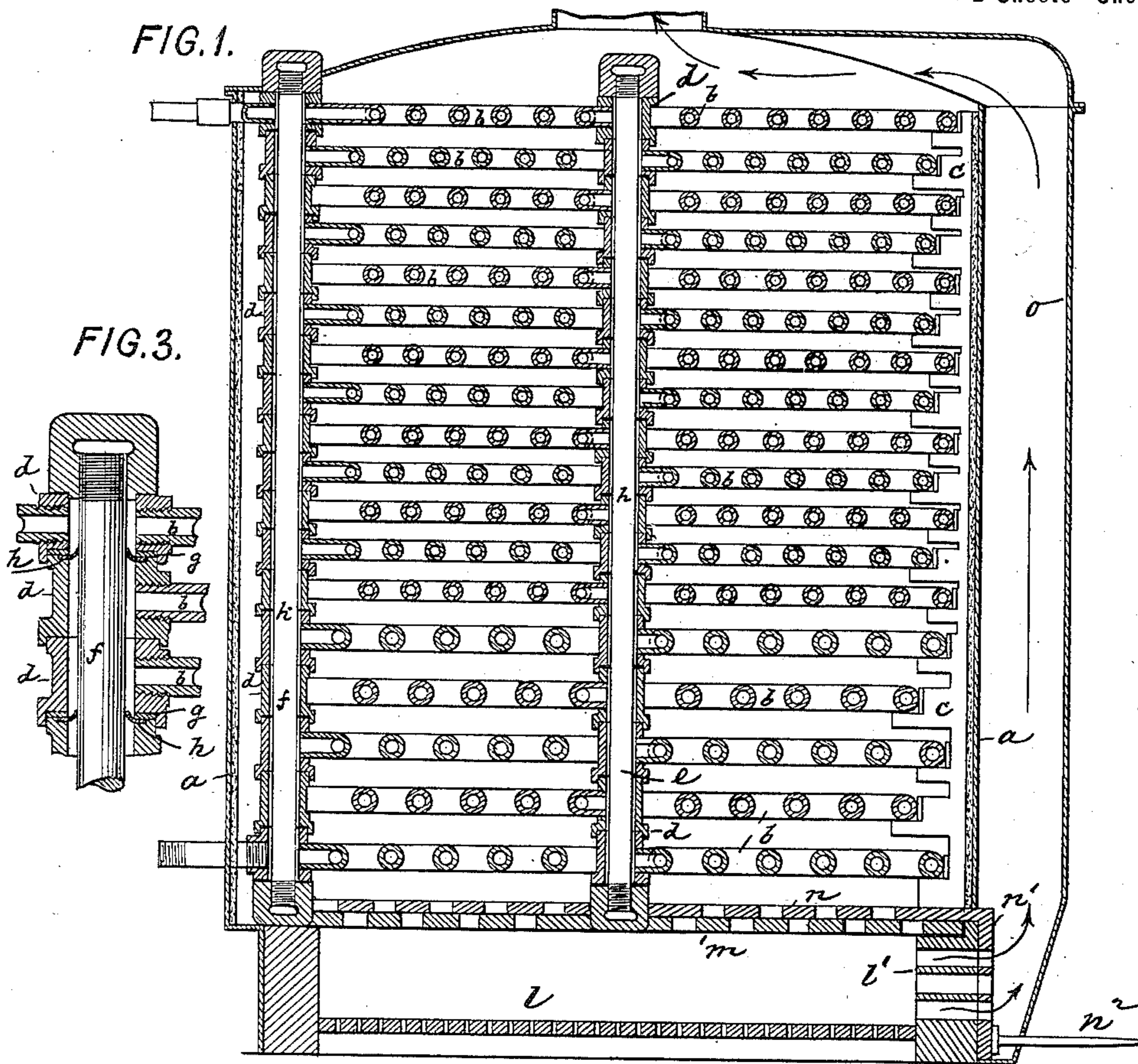
Patented Nov. 13, 1900.

T. MILLER.
STEAM GENERATOR.

(Application filed Jan. 25, 1900.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:
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UNITED STATES PATENT OFFICE.

THEODORE MILLER, OF NEW YORK, N. Y.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 661,545, dated November 13, 1900.

Application filed January 25, 1900. Serial No. 2,714. (No model.)

To all whom it may concern:

Be it known that I, THEODORE MILLER, a citizen of the United States, and a resident of New York city, county and State of New York, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification.

This invention relates to a rapid steam-generator so constructed that the consumption of steam will immediately induce the generation of steam in an exact ratio to its consumption and cause at the same time the feeding of the boiler with a corresponding quantity of water.

It also comprises a novel construction of the fire-box, which is provided with suitable means for warming up the generator-tubes without exposing them to the products of combustion.

On account of these features my steam-generator is particularly adapted to automobiles, steam-launches, stationary and portable steam-engines, and steam-generators generally.

In the accompanying drawings, Figure 1 is a vertical central section of my steam-generator; Fig. 2, a plan with the cover removed; Fig. 3, a detail illustrating the coupling of the coils; Fig. 4, a side elevation, partly in section, showing the generator and connections; and Fig. 5, a plan partly broken away and with the coils omitted.

The letter *a* represents the shell of the generator, within which are contained any suitable number of removable tubes or spiral coils *b*, supported by brackets *c* and arranged in parallel planes or series. These tubes are connected by inner and outer couplings in such a manner that they form a continuous pipe for the generation of steam. The couplings consist of two sets of superposed tubular fittings or sleeves *d*, clamped together by a central bolt *e* and an outer bolt *f* and made of a diameter to form a steam-duct around each bolt. The fittings are provided with packings *g* and with removable annular partitions *h*, that project across the ducts and subdivide them into horizontal compartments. By the arrangement shown in the drawings the uppermost coil connects at its center with the second coil, which connects

at its outer end with the third coil, &c., so that the water or steam descends from coil to coil through the entire generator. By a different arrangement of partitions a different flow may be caused. Thus batteries of two or three coils may together receive the water at their outer ends and convey it to batteries of a greater or less number at their inner ends. In this way it will be seen that the flow may be readily regulated to correspond to the quantity of water and generated steam to be passed. The uppermost coil *b* receives the water from tank *i* by a pump *i*² through a pipe *i*'. The pump *i*² is driven by an eccentric *i*³ on the shaft *i*⁴ of a steam-engine or any other suitable source of power. The pump *i*² is so proportioned as to furnish a quantity of water at least sufficient for the largest steam consumption. A hand-lever *i*⁵ serves to convey the first charge of water into the generator in case the pump cannot be operated by motive power. The uppermost coil *b* also connects with a pipe *j*, having adjustable spring-actuated water-relief valve *j*' and communicating with the water-tank *i*. The water-relief valve *j*' is placed in front of the outlet of the feed-water pipe *i*' and serves to discharge from the boiler either a part or all the water contained therein when the steam-pressure rises above the limit fixed by the tension of the spring of relief-valve *j*'. Thus the area of the effective evaporating-surface of the generator is reduced as the increased steam-pressure forces the water backward in the coils and out through the water-relief valve *j*'.

A reduction of the steam-pressure due to increased consumption will effect the full or partial closing of the water-relief valve *j*', after which the pump *i*² will force the water forward in the coils *b*, thereby increasing the steam generation by covering a greater coil-surface with water. Thus the quantity of feed-water and the steam-pressure are regulated automatically, and as the steam-pressure cannot rise above the limit fixed by the tension of the spring of the water-relief valve *j*' the usual safety-valve for the discharge of surplus steam-pressure may be dispensed with, so that an increased economy is effected by avoiding any escape of steam.

The steam generated within the tubes *b* is

carried by pipe k , having pressure-gage k' and blow-off cock k^2 , to an engine driving the pump i^2 or other apparatus.

The generator may be heated in any manner desired, the fire-chamber or source of heat l being arranged below the shell a . The shell is separated from the fire-chamber by a perforated register composed of two perforated plates m n , of which one—say the plate n —is rotatable. This plate n has a perforated extension n' projecting over a perforated side l' of the fire-chamber that communicates with a by-pass flue o . The arrangement of perforations is such that when heat is admitted from the fire-chamber to the shell a the flue o is shut off, and vice versa. The register n is operated by a handle n^2 , which likewise controls the blow-off cock k^2 by elbow-lever n^3 and link n^4 in such a manner that the cock is closed when the heat is directed into the shell a and opened when the heat is directed into the flue o .

To start the generator, the fireplace is first put in communication with the flue o to obtain a good draft and to indirectly warm up the generator-coils b by the heat radiated or conducted through the closed register-plates m and n , and then the register n is turned to disconnect the flue and to direct the heat into the shell a , so as to thoroughly heat the tubes b . In this way the gases of combustion are brought into contact with the generator-tubes b only after the latter have been well heated, and thereby the condensation of moisture and the precipitation of soot on the generator-tubes b are prevented. The blow-off cock k^2 , having been closed simultaneously by the turning of the register n , the lever i^5 is now manipulated to send in the first charge of water, which while descending through the tubes b will be quickly converted into steam in the uppermost tubes, while the steam will become superheated in the lowermost tubes. The steam generated will then drive the engine, &c., and turn the axle i^4 , which will now actuate the pump i^2 to its full capacity, the surplus water being discharged by the water-relief valve j' , as previously explained. When no steam is required for any length of time, the register n is turned so as to shut off the heat from the shell a and deflect it into

the flue o , while simultaneously the blow-off cock k^2 is opened, whereby the boiler is relieved entirely of steam-pressure. It will thus be seen that in my generator all danger of explosion is averted and that increase of steam-pressure over that permitted by the return-valve is avoided.

The invention may be employed for stationary engines, steam-heaters, or other purposes where the amount of steam to be generated is constant or variable.

My improved generator is safe, economical, and durable, will generate steam quickly whenever desired, and will automatically cease to make steam when the consumption of steam ceases.

What I claim is—

1. A steam-generator composed of a shell, an inclosed series of coiled tubes, tubular fittings that connect the tubes alternately at inner and outer ends, and partitions that project across the fittings and subdivide them into horizontal compartments, substantially as specified.

2. A steam-generator composed of a shell, an inclosed series of coiled tubes, tubular fittings that connect the tubes alternately at inner and outer ends, partitions that project across the fittings and subdivide them into horizontal compartments, and bolts extending longitudinally through the fittings, substantially as specified.

3. A steam-generator composed of a shell, an inclosed series of coiled tubes, fittings connecting the tubes alternately at inner and outer ends, a feed-water pump communicating with the uppermost tube, a steam-pipe having a blow-off cock and communicating with the lowermost tube, a fire-chamber, a flue communicating therewith, a register adapted to conduct the heat either into the shell or into the flue, and means for simultaneously operating said register and the blow-off cock, substantially as specified.

Signed by me at New York city, county and State of New York, this 18th day of January, 1900.

THEODORE MILLER.

Witnesses:

FRANK V. BRIESEN,
WILLIAM MILLER.