



# UNITED STATES PATENT OFFICE.

ROLLIN H. WHITE, OF CLEVELAND, OHIO, ASSIGNOR TO THE WHITE SEWING MACHINE COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

## REGULATED HEATING MECHANISM FOR STEAM-GENERATORS.

No. 829,451.

Specification of Letters Patent.

Patented Aug. 28, 1906.

Application filed October 12, 1903. Serial No. 176,632.

*To all whom it may concern:*

Be it known that I, ROLLIN H. WHITE, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Regulated Heating Mechanism for Steam-Generators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing.

The specific object for which this invention was designed is to utilize kerosene as the fuel for generating steam on a steam-carriage and to automatically regulate the fire in accordance with requirements of the engine for steam. The apparatus, however, is adapted for use with other liquid fuels and it is useful in other places than on steam-carriages. It is believed, however, that the invention is most useful when used for the purpose first mentioned, particularly because it is a practical solution of a problem upon which many clever men have worked diligently during the few years last past—namely, how to dispense with gasolene on steam-automobiles without requiring the watchful care of the operator.

The invention may be here summarized as consisting in the combinations of parts hereinafter described, and pointed out definitely in the claim.

The drawing is a diagrammatic view of the mechanism constituting my invention, some of the constituent parts being shown in section.

Referring to the parts by letters, A represents an oil-supply tank for containing kerosene or other oil.

B represents a float-valve chamber which is connected with the oil-tank by a pipe *a*. It contains a float-valve *b*, which automatically regulates the quantity of oil which may enter said chamber. The oil may flow by gravity from the tank to the float-valve chamber, or it may be forced into said chamber by compressed air in the tank A.

C represents an atomizer-nozzle of any familiar or suitable construction, and *c* represents the pipe connecting the chamber B with this nozzle.

D represents a pipe which connects the nozzle with the compressed-air tank F. In the pipe D is a valve E, which is oper-

ated by a thermostat, the location of which will be explained presently.

N represents an air-pump which is operatively connected with the engine J, and a pipe *n* leads from this air-pump to the compressed-air tank F.

G represents a steam-generator of the flasher type and constructed of a series of superposed coils connected in series. Water is admitted to the upper coil through a pipe L, and superheated steam is discharged from the lower coil to the pipe H, which is connected with the engine J. It is understood, of course, that the water delivered to the generator is forced through the pipe L, and into the generator under considerable pressure. It is with this type of generator alone that the herein-described invention is applicable. The pressure and temperature of the steam in such a generator do not bear any definite relationship with each other. Therefore it is not possible to accomplish satisfactory regulation of the fire to heat such a generator by means of devices operated by the steam-pressure. Such regulation is of necessity attained in a practical way by the use of a thermostat which is subject to the action of the temperature of the steam when it is about to be discharged from the lower coils of the generator.

The thermostat may be of substantially the construction illustrated in my prior patent, No. 707,478, and dated August 19, 1902, and is located in a straight tube *g*, forming one of the lower coils of said generator. This thermostat includes a tube *k* of copper or some metal having a relatively high coefficient of expansion, which tube is rigidly fastened to the valve-casing K. Within this tube is a rod *k'* of a relatively low coefficient of expansion, as iron, which is made fast to the closed outer end of the tube. The other end of this rod projects into the valve-casing and engages with the bell-crank lever *e* therein, whereby the valve E may be raised to a greater or less extent from its seat or allowed to seat itself by gravity or otherwise. The higher the heat to which this thermostat is subjected the more will the end of this iron rod recede from the bell-crank lever with which it engages, and therefore the more will this valve be permitted to close. As the temperature to which the thermostat is sub-

jected is lowered the end of the rod will move in a contrary direction, and thereby open the valve to an extent proportionate to the temperature.

5 In the pipe *n* between the air-pump and the air-tank is a check-valve *n'*. A by-pass *M* is connected with this pipe around that part thereof in which the check-valve *n'* is placed, and in this by-pass is secured a regulator. This regulator is substantially like that which is shown and described in my prior patent, No. 737,984, dated September 1, 1903. This regulator has a casing *P*, across which a flexible diaphragm *p* is placed. The pressure within the air-tank acts against one side of the diaphragm, and on the other side of said diaphragm is a valve *Q*, adapted to be operated thereby to open a relief-passage for the air. The opening of this valve permits the air which is driven along by the air-pump *N* to enter the valve-casing *P*, and this air freely escapes from this casing through the pipe *W*. A spring is arranged to close the valve when the pressure in the tank has been sufficiently reduced.

15 *T* represents a burner which is arranged beneath the generator so as to heat the same. The burner shown is of familiar form, and therefore it is not thought necessary to describe it. Any other suitable burner may be employed.

20 The air-pipe *D* contains a manually-operated valve *S* between the tank *F* and the valve *E*. When this valve *S* is open, the flow of compressed air through pipe *D* and from the atomizer-nozzle draws oil from the float-valve chamber. As a result a stream of mixed oil-spray and air is discharged from said nozzle into the burner, at which it is burned. The flame heats the generator and transforms the water therein into steam. When this steam is of the desired maximum temperature, the thermostat permits the valve *E* to close or nearly close, thereby diminishing the flow of compressed air through pipe *D* and as a consequence diminishing the

supply of combustible furnished to the burner. When the temperature of the steam falls sufficiently, the thermostat operates to open this valve, and thereby to increase the supply of combustible furnished to the burner. Steam is taken from the generator through pipe *H* and delivered to the engine, and the engine operates the air-pump. By the operation of this pump and the action of the relief-valve *Q* the air-pressure in the tank *F* is maintained substantially constant.

The apparatus as an entirety is self-contained and automatic in its action. It permits the use of kerosene or other liquid fuel, so that the proper amount is furnished to generate steam in volume commensurate with the demand of the engine and substantially uniform as to degree of superheat and to do this automatically without assistance from the operator.

Having described my invention, I claim—  
The combination of a steam-generator of the flasher type consisting of a plurality of superposed coils of pipe connected in series, having the water-inlet connected to an upper coil and the steam-outlet to a lower coil, a heating-burner under said generator, an atomizer-nozzle furnishing combustible to the burner, an oil-reservoir connected with the nozzle, an air-pipe connected with the nozzle, a compressed-air tank connected with said air-pipe, a valve in said pipe, a thermostat in one of the lower coils of the generator, means operated by the thermostat for operating said valve, an air-pump, a pipe connecting the same with the air-tank, a check-valve in said pipe, a by-pass around said check-valve, and an automatic release-valve in said by-pass, substantially as and for the purpose specified.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

ROLLIN H. WHITE.

Witnesses:

E. L. THURSTON,  
B. W. BROCKETT.