No. 861,565. PATENTED JULY 30, 1907.

R. H. WHITE.

BURNER REGULATOR FOR STEAM BOILERS.

APPLICATION FILED APR. 3, 1900.

2 SHEETS—SHEET 1.

Fig. 1.

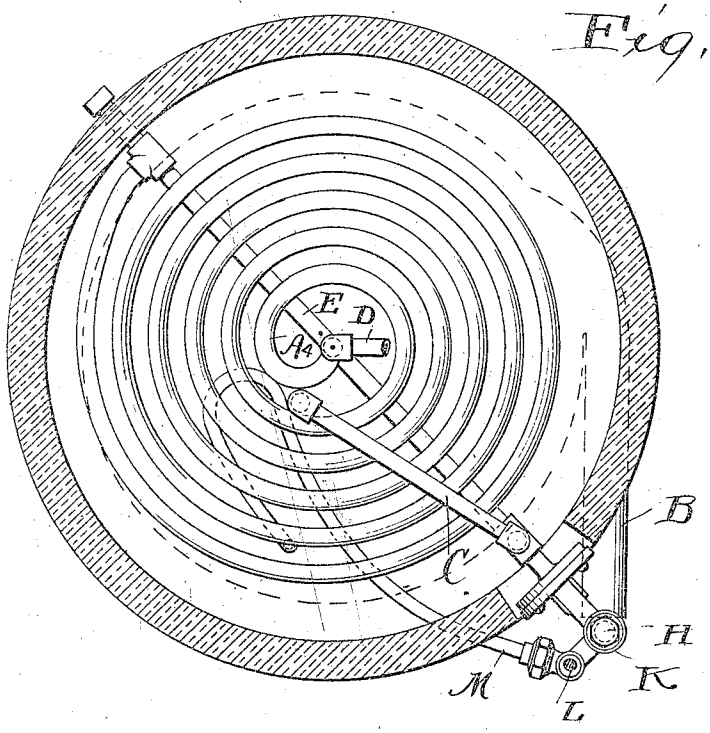
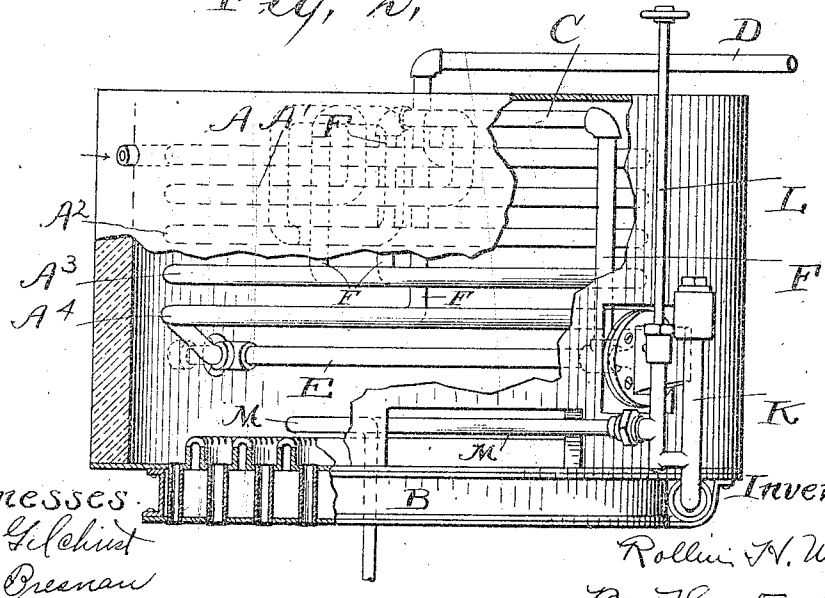


Fig. 2.



Witnesses
E. B. Gilchrist
N. L. Brennan

Inventor
Rollin H. White
By Thurston & Bates
Attorneys

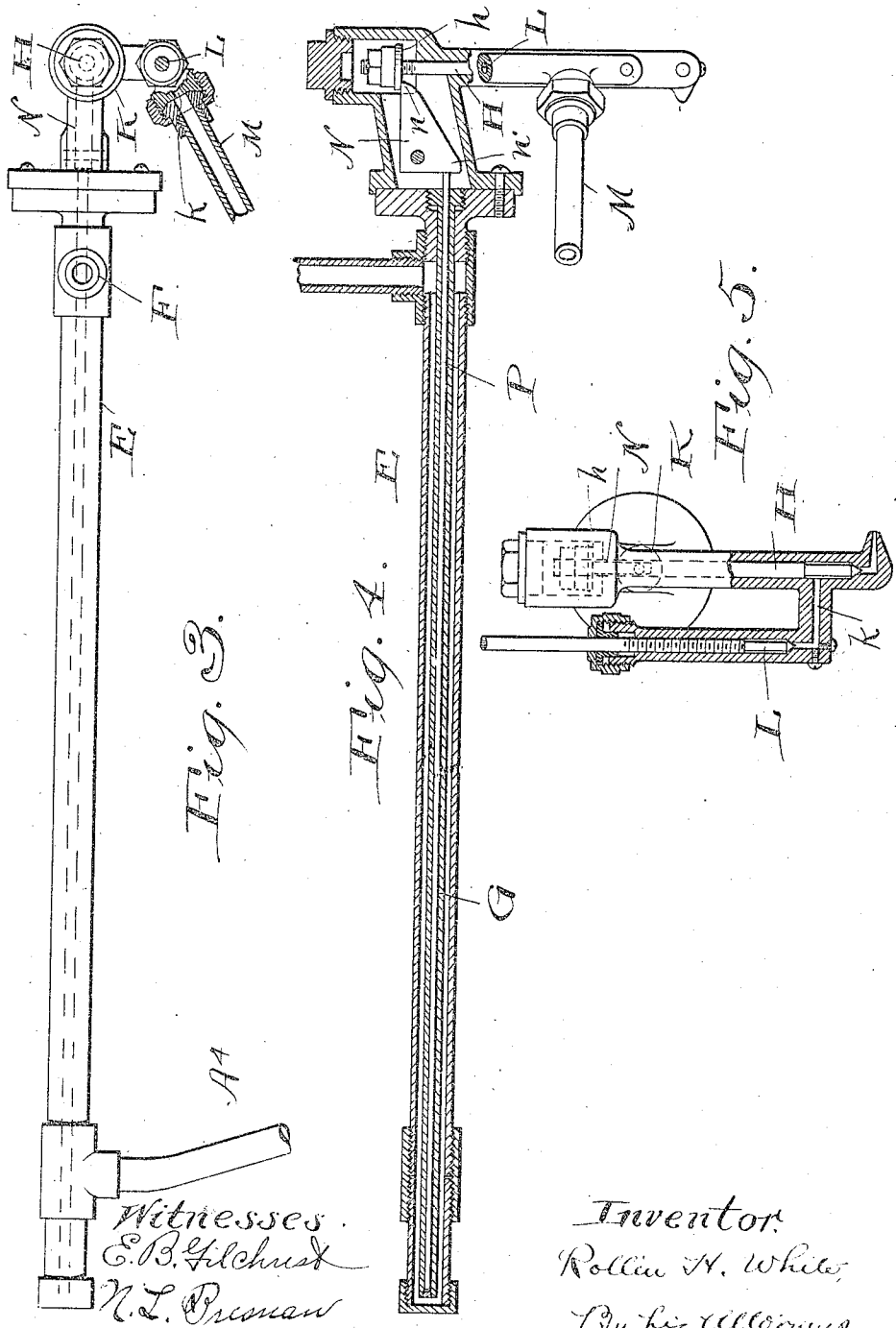
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C. B. Gilchrist
N. L. Brennan

Inventor:
Rollin H. White,
By his Attorneys
Thurston & Bacon

UNITED STATES PATENT OFFICE.

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

BURNER-REGULATOR FOR STEAM-BOILERS.

No. 861,565. Specification of Letters Patent. Patented July 30, 1907.

Application filed April 3, 1900. Serial No. 11,311.

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 Burner-Regulators for Steam-Boilers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The invention relates to mechanism for controlling the flow of fuel to the burner by which the steam generator is heated.

The invention relates to apparatus in which fluid fuel is used, and it is especially useful on steam carriages and steam boats.

The object is to provide means which will operate automatically to regulate the amount of fuel burned and consequently the amount of steam generated, or which may be operated at will to entirely shut off the fuel supply.

The invention consists in the construction and combination of parts hereinafter described and pointed out definitely in the claims.

In the drawings, Figure 1 is a plan view of the device showing only the lower coil of the generator and pipe E and the other pipes respectively connected with said lower coil and pipe E; and Fig. 2 is a side elevation, partly in section, of a steam generator adapted for combination with said invention, which figures also show the invention so combined. Fig. 3 is a plan view, partly in section, of the invention; Fig. 4 is an elevation, partly broken away, of the thermostat and the mechanism which it operates, and Fig. 5 is an end view partly in section of the valve casing and the valves contained therein, one of which is operated by the thermostat.

The generator as shown is a "flasher" and consists of a plurality of coils A, A′, A², etc., which are arranged one above another over the burner B. These coils are connected in series from the top to the bottom; the water is forced through the pipe C into the upper coil and the steam leaves the generator through the pipe D which is connected with the lowest coil. When the generator is in use the two or three or more lower coils will contain steam only which will be superheated while in said coils. The connections between the several coils is preferably by riser tubes F which pass over all of the coils,—which construction prevents water from settling by gravity into the lower coils. A straight horizontal tube E forms a part of the connection between the two lowest coils. This tube lies between the lowest coil and the burner, the steam passing from next to the lowest coil into the lowest coil must necessarily pass through this tube E. This tube contains a mechanical thermostat adapted to be operated by the changing temperatures, and by its operation to control the movement of the valve which governs the flow of the fluid to the burner. The valve H which it so controls is a needle valve of familiar construction, which is adapted to move vertically by gravity to its seat and thereby to prevent the flow of the fluid through the duct *k* in a valve casing K. The pipe M connects one end of this duct with a supply tank for the gas or gasolene or other fluid fuel, while the other end of said duct terminates in a nozzle which discharges into the burner B. A needle valve L, having a screw threaded connection with the casing may be turned by hand and thereby moved toward or from its seat, which is located in the duct *k*, preferably between the valve H and point where the pipe M is connected with the valve casing; and it is adapted to entirely shut off the flow of gas through said casing to the burner. This valve L is however, always open when the boiler is in use, and at such times the automatic movements of the valve H regulate the flow of the fluid to the burner. The valve H in the particular construction shown is raised from its seat by one arm *n* of a bell crank lever N which engages with collar *h*, which is screwed onto the valve,—the other arm *n′* of this bell crank lever being located so as to be engaged by a rod P which is a part of the thermostat.

The specific thermostat shown is composed of two parallel pieces of metal G and P which expand unequally under the influence of steam. The piece G is a tube which may be made of copper or other metal of relatively great expansibility, and the end of this tube is fastened to the valve casing, while its other end which is closed is fastened to the adjacent end of the rod P which is in said tube. This rod should be made of iron or some other metal which does not expand as much as the tube G. The free end of this rod P enters the valve casing and is adapted to engage with the arm *n′* of the bell crank lever. This thermostat is surrounded by the steam in the tube E, and is consequently in a position to be lengthened or shortened by the changing temperature of the steam.

The parts having been properly adjusted, operate as follows: If the generator is generating more steam than the engine is using the temperature of the steam will increase, consequently the rod P will be drawn backward (because the tube G is lengthened more than the rod P is lengthened) the valve is therefore permitted to fall or to move toward its seat thereby choking off the supply of fuel. The result is that the burner gives less heat wherefore less steam is generated. Where steam is being used up very fast the temperature of the steam in the generator will be reduced. When it is reduced the rod P moves in the contrary direction with the result of slightly opening the valve.

This action goes on automatically and continuously,—the valve H being opened when the boiler is not generating as much steam as is necessary to properly supply the engine, and being closed when too much steam is being generated. The screw valve L is closed when it is desired to stop generating steam.

There is a hole in the top of the valve casing through which the valve H may be inserted. This hole is closed by a screw plug, which may be removed whenever the valve H is to be removed. The collar *h* screws onto the valve H and may therefore be adjusted up or down so that its valve will be raised or seated by the thermostat at any predetermined temperatures of the steam. It is not therefore necessary in constructing the described parts in quantities that all thermostats shall be of exactly the same size or have the same expansibility.

Having described my invention, I claim:

1. The combination of a steam generator comprising a continuous coil, and a heating burner therefor, of a thermostat placed within the coil adjacent to the burner and consisting of an outer tube of relatively high expansibility, a head to which said tube is secured at one end, a rod of relatively low expansibility within said tube, a casing secured to said head, a self closing valve for controlling the supply of combustible delivered to the burner, and having a stem slidable in said casing, an adjustable nut on said valve stem, and a bell-crank member pivoted within the casing and having one portion bearing against said nut and the other against said rod, said tube, rod, bell-crank and nut being disconnected at at least one point whereby excessive heat results simply in the separation of such connection, substantially as described.

2. The combination of a steam generator comprising a continuous coil and having near its discharge end a straight pipe section, and a heating burner therefor, with a head secured to said straight coil and plugging one end thereof, a tube of high expansibility which is fastened to said head and extends therefrom into said straight pipe section and has a closed outer end, a rod of relatively low expansibility in said tube operatively connected therewith and passing entirely through said head, a valve casing secured to said head whereby one open end of the valve casing is closed, a self-closing valve for controlling the supply of combustible delivered to the burner, and having a slidable stem which projects into the casing chamber and has an adjustable shoulder therein, and a pivoted bell-crank lever located in said casing, one arm whereof is engaged by the end of the thermostat rod while the other arm of said lever engages the under side of said adjustable shoulder on the valve stem, substantially as described.

3. In a thermostat, in combination, a head, a horizontal tube of relatively high expansibility connected at one end thereto, a casing secured to said head and having flat parallel vertical sides, a bell-crank pivoted within said casing and guided by said sides, a rod of relatively low expansibility within said tube confined within the tube at the outer end thereof but freely abutting the bell-crank, said casing having a depending tubular portion having entrance and exit passage-ways communicating therewith, a valve stem within such tubular portion operating to control the intercommunication of such passage-ways, a nut screwing onto said stem and engaged on its under side by said bell crank, there being an opening into the casing adjacent to said nut for adjusting it, and means for closing said opening, with free space beyond the nut and stem whereby excessive cold simply moves the stem into such free space and excessive heat separates the bell-crank-and-rod connection from the same to the highly expansible tube, substantially as described.

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

ROLLIN H. WHITE.

Witnesses:
E. L. THURSTON,
E. B. GILCHRIST.