(No Model.) 2 Sheets—Sheet 1.

J. S. VALENTINE.

STEAM GENERATOR OR HOT WATER HEATER.

No. 533,831. Patented Feb. 5, 1895.

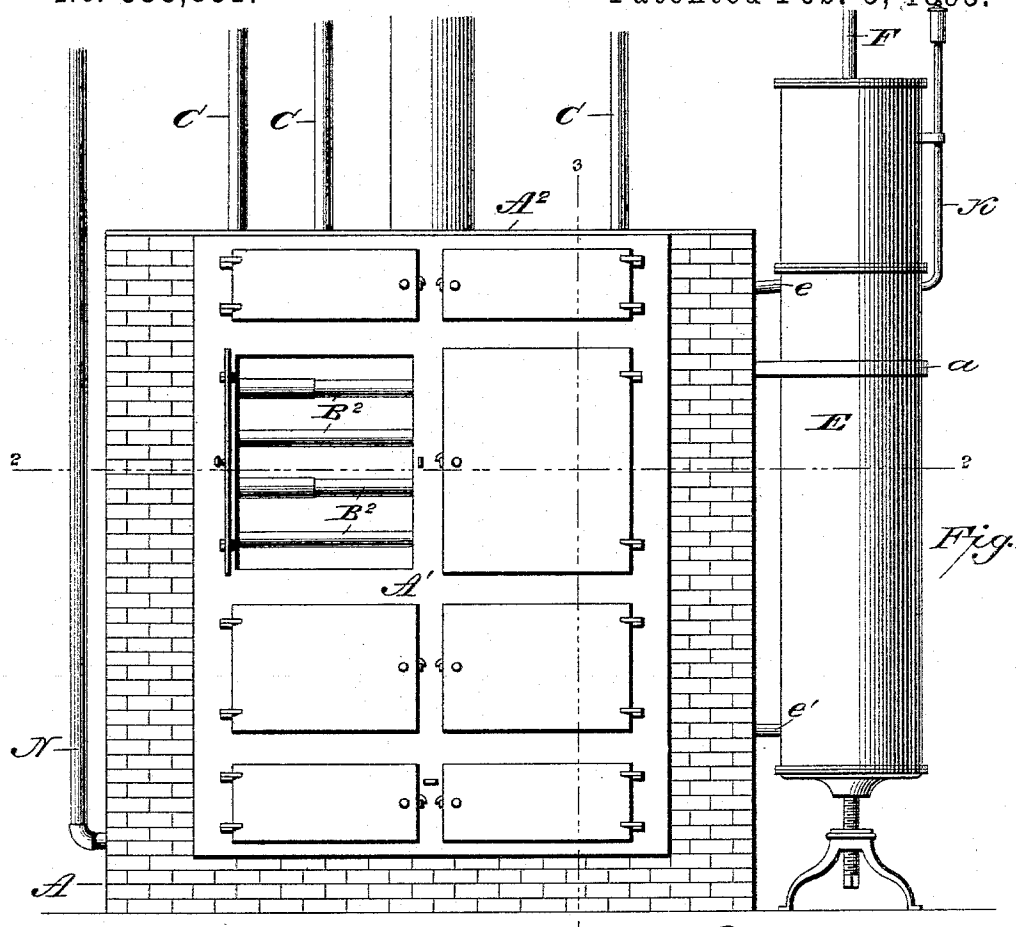

Fig. 1.

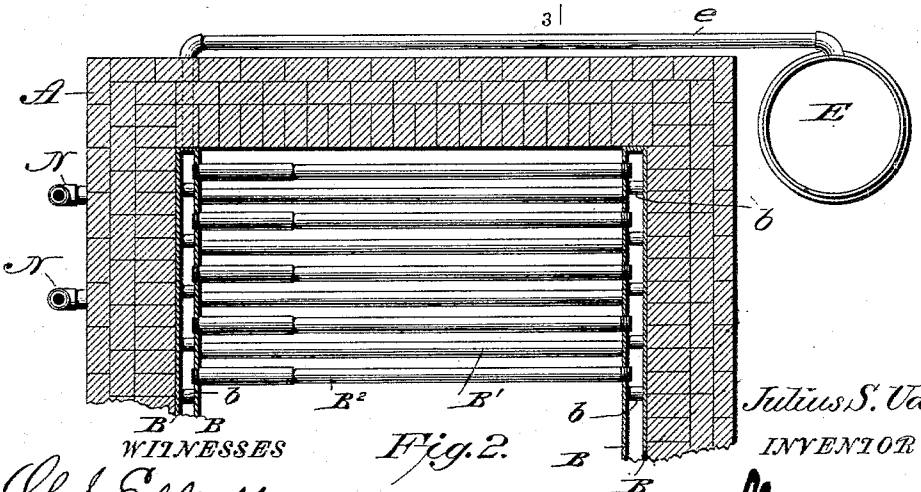

Fig. 2.

WITNESSES

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INVENTOR

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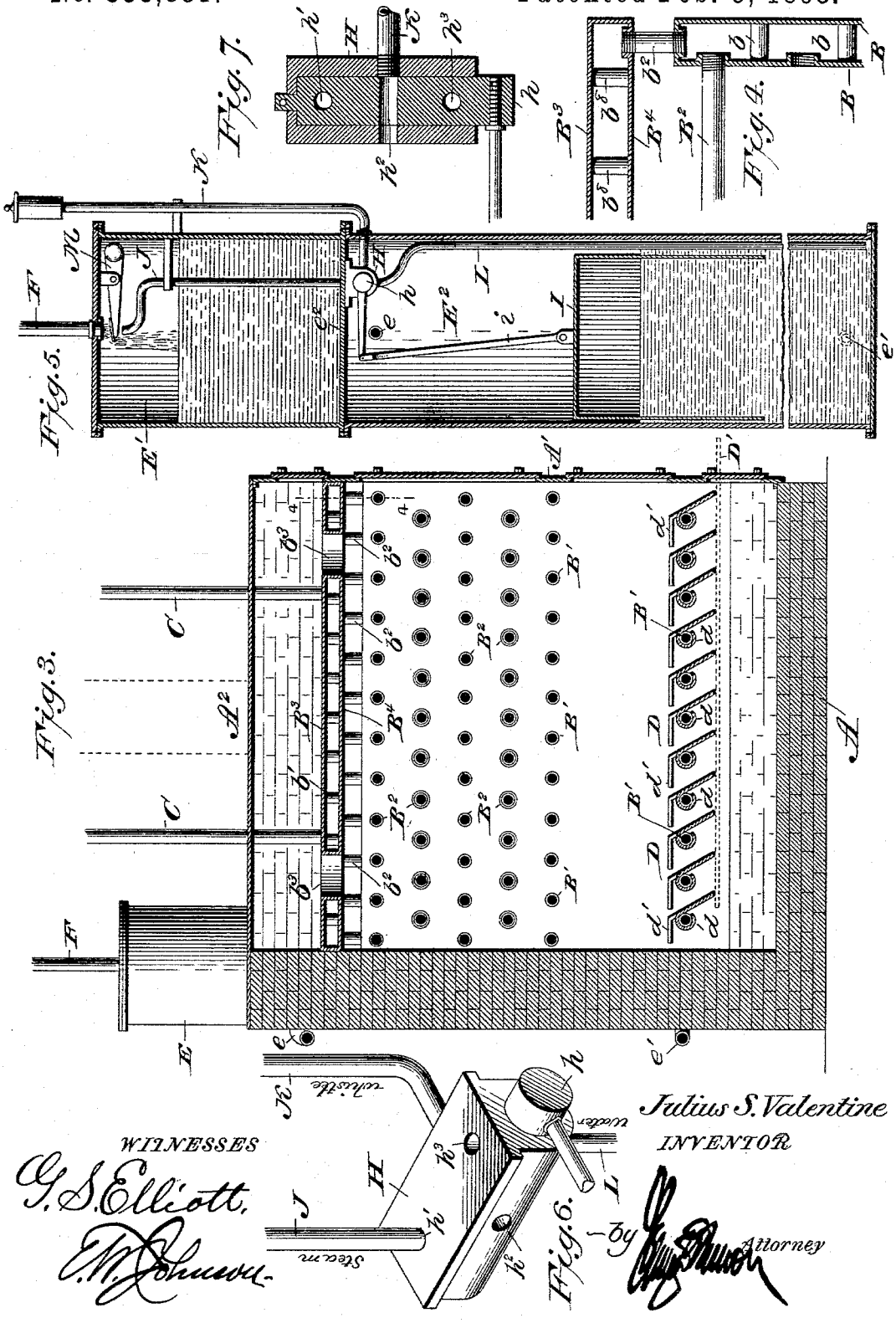

UNITED STATES PATENT OFFICE.

JULIUS S. VALENTINE, OF PENT WATER, MICHIGAN.

STEAM-GENERATOR OR HOT-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 533,831, dated February 5, 1895.

Application filed May 24, 1894. Serial No. 512,349. (No model.)

To all whom it may concern:

Be it known that I, JULIUS S. VALENTINE, a citizen of the United States of America, residing at Pent Water, in the county of Oceana and State of Michigan, have invented certain new and useful Improvements in Steam-Generators or Water-Heaters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

The object of this invention is to provide an improved device for supplying hot water or steam to heating apparatus for buildings; and it consists in the combination of an improved furnace having water or steam tubes which are connected with a water supply tank, said water supply tank being adjustably supported so that it can be raised and lowered to change the heating system from hot water to steam without varying the construction of the apparatus.

The invention further consists in the construction and combination of the parts, as will be hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a front elevation of a heating furnace with its supply tank. Fig. 2 is a horizontal sectional view taken on the line 2—2 of Fig. 1. Fig. 3 is a vertical section on the line 3—3, Fig. 1. Fig. 4 is a detail sectional view on the line 4—4 of Fig. 3. Fig. 5 is a vertical sectional view of the supply tank; Fig. 6, a detail view of the valve located within the supply tank, and Fig. 7 a sectional view of the valve.

A designates the casing of the furnace which may be built of masonry in the usual manner, being provided with a front plate A′ of metal having doorways and doors as shown. The masonry work is covered by a top plate A^2 having openings through which pass the smoke-stack and the pipes which lead to the radiators or other means for distributing the heat.

The furnace is within the casing A and the side walls of the same are each made up of two plates B B connected to each other at heir ends by strips and at intermediate pointst by tie-rods *b* so as to provide chambers which are thoroughly braced, as shown in Fig. 2. These chambers communicate with each other by a series of tubes B′ and B^2 which extend transversely across the furnace and are attached rigidly to the inner plates of the side walls by entering screw-threaded apertures therein. The tubes B^2 are each made up of two sections which turn one into the other to provide for their entrance into the side walls as hereinbefore stated. The upper part of the furnace proper is also composed of two plates, B^3 and B^4, connected to each other by end strips and tie-rods b^3 forming a chamber which communicates with the chambers in the side walls by means of short tubes b^2, as shown in Fig. 4. Through the upper plate B^3 of the upper chamber pass the pipes C which lead to the radiators or other means for distributing the heat, openings or flues b^3 extending through the upper chamber to connect the combustion chamber with the smoke-stack.

The lower set of transverse tubes B′ form the grate-bars and support plates D which are slitted at intervals so that every alternate portion *d* so formed may be bent to embrace the tube while the other portion, *d*′, is bent to lie horizontally, as shown in Fig. 3, the lower part of the strips or plates being connected to a bar D′ which extends through the front plate A′, so that by reciprocating this bar the grate will be oscillated; thus providing a simple and effective oscillating grate.

E designates the water supply tank from which extend pipes *e* and *e*′, the pipe *e* connecting with the upper chamber of the furnace formed by the plates B^3 and B^4 while the other pipe, *e*′, connects with the lower part of one of the side chambers. The pipes *e e*′ are connected with the chambers of the furnace by means of suitable turning connections or union joints of ordinary construction, which permit movement of the pipes when the tank E is raised or lowered by the supporting screw which abuts against the plate beneath the tank, said supporting screw passing through an open-frame support (as shown in Fig. 1).

The tank E is divided by a plate e^2 into an upper compartment E′ and a lower compartment E^2, the upper compartment being con-

nected to a water supply pipe F and the lower compartment is supplied with water from the upper compartment through a valve H as hereinafter described. Within the lower compartment is a float I which is connected by a rod *i* to an arm projecting from the turning-plug *h* of the valve H. The turning-plug of the valve H is provided with three openings or ways *h'*, h^2 and h^3 which are adapted to register with corresponding openings in the valve casing. The upper end of the opening *h'* in the valve connects with a pipe J extending upwardly in the compartment E' to a point near the upper end of the same while the lower end of said opening opens into the compartment E^2. One end of the opening h^2 opens into the compartment E^2 while the other end is connected to a pipe K which leads to a whistle, and the upper end of the opening h^3 communicates with an opening through the bottom-plate e^2 of the upper compartment while the other end connects with a pipe L leading to the lower end of the lower compartment E^3. It will be thus understood that when the turning-plug of the valve H is turned by the float to bring the openings on a line water from the tank E' will be supplied to the tank E^2 through the pipe L, steam from the lower compartment will pass into the upper compartment through the pipe J to equalize the pressure in both compartments, and steam will pass into the pipe K to sound an alarm to indicate that the valve is in position to supply the lower compartment.

The upper end of the tank is provided with a suitable vent opening which is normally closed by a gravity valve M, as shown in Fig. 5.

The tank E is supported near the masonry work or casing A in such a manner that it may be raised and lowered for the purpose of adjusting the water level in the furnace. In the drawings I have shown an open-frame support having a threaded opening through which passes a screw the upper end of which bears against the under side of the tank, the tank being braced in an upright position by a band *a* extending from the casing.

The lower portion of one of the chambers in the side walls of the furnace has connected thereto a number of return pipes N which lead from the radiators, or other means for distributing the heat, back to the furnace.

In operation the upper compartment of the tank receives the water supply and it passes through the valve and pipe L to the lower compartment until a sufficient quantity has been let therein to operate the float to close the valve. The water in the lower compartment flows into the chambers in the side walls of the furnace and into the transverse tubes B' and B^2 and is heated therein by the fire placed upon the grate-bars, the steam passing into the upper compartment through the tubes b^2 and from there to the radiators by way of the pipes C, being returned through the pipes N. Some of the steam passes through the pipe *e* to the upper part of the lower compartment of the tank so that when the water therein falls below its normal level and the valve turns by the lowering of the float the steam will pass into the whistle and into the pipe leading to the upper part of the upper compartment of the tank. When the proper water level is resumed the valve H will be automatically closed. The valve M will prevent a vacuum being formed in the upper compartment of the tank. While the water is falling from the upper to the lower compartment the steam in the lower compartment will cause an alarm to be sounded, and a continued alarm will indicate that the upper compartment of the tank needs refilling, which is done by turning the cock in the supply pipe.

When it is desired to use the device as a hot water heater both chambers of the tank are completely filled and the valve in the pipe leading to the alarm is turned to cut off communication with said alarm. The tank will then completely fill the chambers and transverse pipes or tubes of the furnace so that a circulation will be kept up in the usual manner.

Where there is a low water pressure the tank may be elevated to its highest point.

Another object in providing a vertically adjustable tank is that a greater or less number of the transverse tubes can be kept filled with water, thus increasing or decreasing the heating capacity of the furnace.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a heating apparatus having a water-tube grate and transverse tubes B' and B^2 above said grate, the tubes connecting with water chambers, of a tank divided into two compartments the lower compartment communicating with the water chambers of the furnace and the upper compartment serving as a source of supply for the lower compartment, substantially as set forth.

2. In a heating apparatus, the combination, of a casing constructed so as to have chambered walls, a series of transverse tubes B' connecting said chambers and an intermediate series of tubes B^2 having turning connections, substantially as shown and for the purpose set forth.

3. In a furnace or heating apparatus, the combination, of the side walls having chambers braced by tie-rods, transverse tubes connecting the chambers in the side walls, and an upper chamber having tie-rods and openings or flues b^3 for the passage of the products of combustion, substantially as shown and for the purpose set forth.

4. In a heating apparatus constructed substantially as shown, the combination, of a tank having a water supply pipe which is connected with the water chamber of the heating apparatus and a pipe connected with a steam supply, a valve connecting said tank with a second tank, said valve being adapted to be operated by a float contained in the lower tank, substantially as shown, whereby

steam can be conveyed from the furnace into the lower tank and from there into the upper tank and communication established between the tanks for conveying water from one to the other, substantially as set forth.

5. In combination with a heating apparatus constructed substantially as shown, of a tank divided into two compartments, the lower compartment containing a valve and float, the valve having ways for establishing communication between the upper part of the lower compartment and the upper part of the upper compartment, directly between the two compartments and with means for sounding an alarm, substantially as shown and described.

6. A supply tank for furnaces having two compartments, means for establishing communication between said compartments, the upper compartment having a vent opening and valve therefor, substantially as shown and for the purpose set forth.

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

JULIUS S. VALENTINE.

Witnesses:
C. H. TULLAR,
A. E. SOUTER.