2 Sheets—Sheet 1.

I. A. SALMON.

Apparatus for Heating Apartments, Railroad Cars, &c

No. 210,563. Patented Dec. 3, 1878.

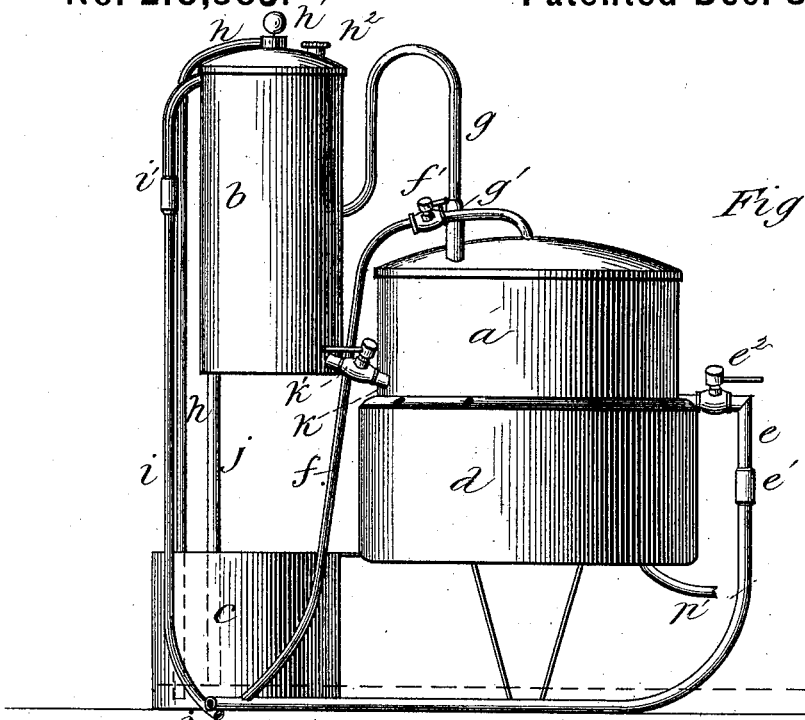

Fig. 1.

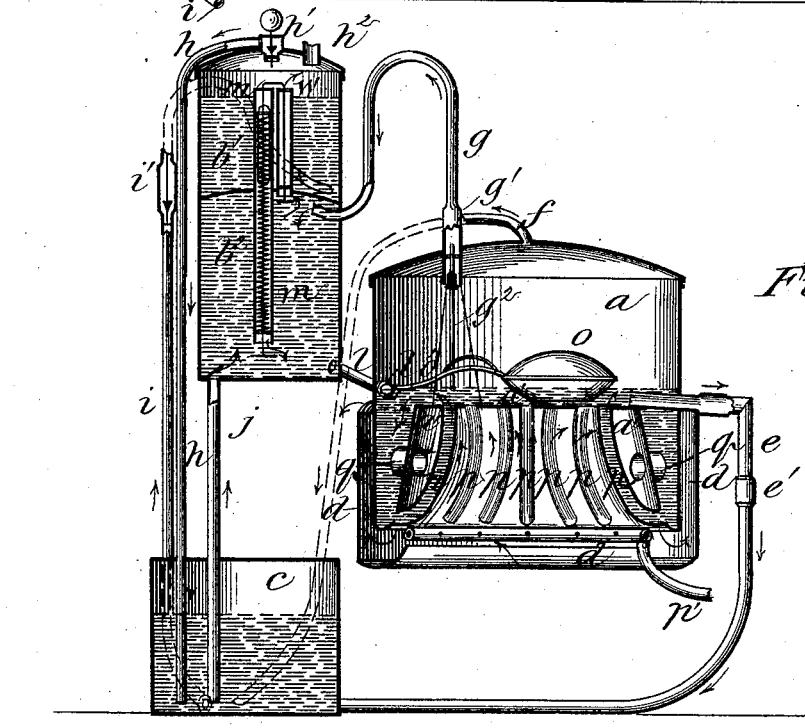

Fig. 2.

Attest:
L. H. Latimer
S. L. Potter.

Inventor:
Ira A. Salmon

2 Sheets—Sheet 2.

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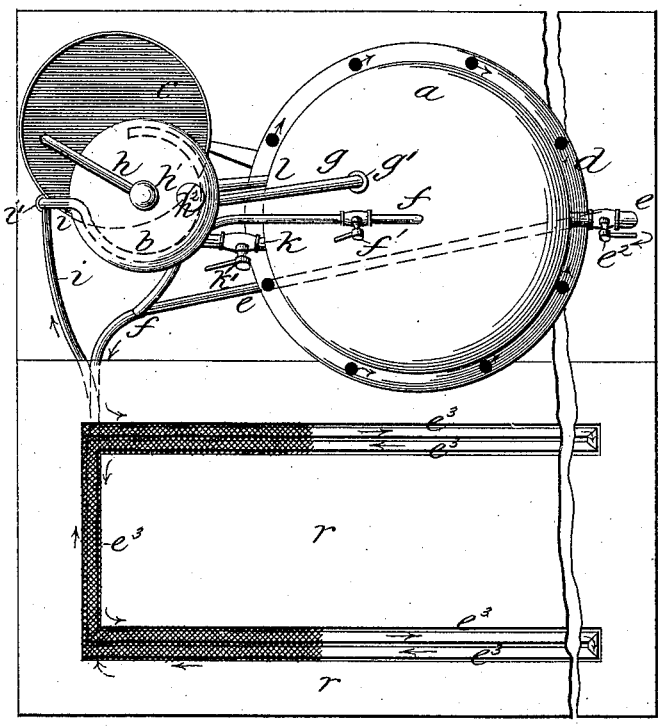
Fig. 3



Attest:

L. H. Latimer
S. L. Potter.

Inventor.

Ira A. Salmon

UNITED STATES PATENT OFFICE.

IRA A. SALMON, OF BOSTON, ASSIGNOR OF ONE-HALF HIS RIGHT TO DAVID S. FOGG, OF NORWOOD, MASSACHUSETTS.

IMPROVEMENT IN APPARATUS FOR HEATING APARTMENTS, RAILROAD-CARS, &c.

Specification forming part of Letters Patent No. **210,563**, dated December 3, 1878; application filed April 10, 1878.

To all whom it may concern:

Be it known that I, IRA A. SALMON, of Boston, in the county of Suffolk and Commonwealth of Massachusetts, have invented a new and useful Improvement in Portable Apparatus for Heating Apartments, Railroad-Cars, &c., of which the following is a specification:

The object of my invention is to provide a safe, economical, and convenient means of warming apartments, railroad-cars, and other places for which it may be found suitable, by the use of steam or hot water, and the apparatus is suitable to the use of either.

In the drawings annexed, Figure 1 is an elevation or side view. Fig. 2 is a vertical central sectional view, showing the arrangement of the valves and working parts of the apparatus; and Fig. 3 is a plan or top view.

a in the drawings represents the boiler. *b* in the drawings represents a tank or reservoir, divided into two compartments by a metallic diaphragm. *c* is a receptacle for the surplus water which may overflow from the tank *b*. *d* in the drawings represents a jacket covering the water-leg of the boiler, and, passing below the bottom of the water-leg, curves inward and upward toward and into the lower part of the combustion-chamber, leaving a space between the jacket and water-leg, which takes from and carries off from the combustion-chamber the gases resulting from combustion, so they may be conducted to a chimney or funnel extending to the open air. It also retains and economizes the heat, and protects the boiler from the air, and may cover the entire boiler. *e* in the drawings is a pipe extending from the boiler *a* to the radiator e^3. *f* in the drawings represents a pipe taken from the boiler *a*, thence extending to and joining into the pipe *e*, and *f'* is a cock in the pipe *f*. *g* is a pipe from the interior of the boiler *a*, extending through its top upward, curving and entering the tank *b* below the diaphragm, with a valve, g^1, and a valve-stem, g^2. *h* in the drawings is a pipe from the top of the tank *b* to the receptacle for surplus water *c*, having in it the weighted valve h^1, allowing any surplus of water flowing into the tank *b* to overflow into the receptacle *c*. *i* in the drawings represents a pipe leading from the lowest point of the radiator e^3, or from the end farthest from the boiler, up to and entering the tank *b* at or near the top. *j* in the drawings represents a water-pipe from near the bottom of the water-receptacle *c* to and entering the bottom of the tank *b*, with a valve in it allowing the water to flow from *c* to *b* when there is a vacuum in *b*, but preventing a downward flow from *b* to *c*. *k* in the drawings represents a water-pipe from the lower part of the tank *b* to the boiler *a*, with a cock, *k'*, in it, the use of which is hereinafter explained. *l* in the drawings represents a pipe from the lower part of the tank *b* to the boiler *a*, having in its lower part within the boiler *a* the valve or cock *l'*. *m* and *n* are pipes connecting the upper part, b^1, and the lower part, b^2, of the tank *b* through the diaphragm, *m* being open to the diaphragm to let water down from b^1 to b^2, and *n* to allow air to escape from b^2 to b^1, both being controlled, either closed or open, by valves which are connected and move together simultaneously, opening and closing at the same time. *o* represents a float attached to a lever or arm which opens and closes the cock or valve *l'* at the lower end of the water-pipe *l*, and raises and lowers the valve g^2.

p p p p p p p in the drawings represent water-pipes from the lower part of the water-leg of the boiler, diagonally through the combustion-chamber, to and through the bottom sheet of the boiler. The water in them, being heated, rises into the boiler, while it flows downward in the water-leg, thus keeping up a circulation. *p'* represents a coil of pipe perforated for burning gas.

q q in the drawings represent flues from the combustion-chamber, through the water-leg, into the space between the water-leg and the jacket *d*, to provide for the escape of the gases from the combustion-chamber.

The valve-stem g^2 is looped around or otherwise connected with the arm or lever actuated by the rising and falling of the float *o*, so that the falling of the float *o* a certain distance will open the valve g^2 in the pipe *g* and allow the passage of steam from the boiler *a* into the lower compartment of the tank *b*, and also open the valve or cock *l'* and allow the flow of water from the tank *b* to the boiler *a*, and the

filling of the boiler in this way raises the float *o*, and, at a certain height of water in the boiler the valve or cock l' and the valve g^2 in the pipe *g* are both closed, leaving the lower compartment of the tank *b* partially filled with steam, when the steam will be condensed and the compartment b^2 again filled with water from the water-receptacle *c*, or from the upper compartment, b^1, of the tank *b*, or from both.

The water-receptacle *c* may be placed on a level with the tank *b*, in which case the water-pipe *j* will be made to enter the top of the tank *b*, being provided with a valve opening toward the tank b^1.

The pipe *e* may be continued through the apartment, to be warmed with folds or doublings, serving as a radiator either for water or steam heating, or any other suitable arrangement of radiators may be used.

When the apparatus is used with steam, pipe *i* must not be over one-half inch inside diameter, and that size will answer very well also for water-heating.

I do not confine myself to any particular form or relative position of the parts of the apparatus before described.

To use the apparatus with water, the cock f' in the steam-pipe *f* must be closed after the boiler is filled with water, and the cocks e^2 and k' are opened. A fire from gas, petroleum, or other suitable fuel, being kindled in the combustion-chamber, the water in the boiler *a* soon boils, and generates steam in the top of the boiler *a*, which displaces the water, forcing it, through pipe *e*, radiator e^3, and pipe *i*, into the tank *b*, from which it overflows into the receptacle *c*.

When the water in the boiler has been forced out, as before described, the float *o* descends until the lever or arm to which it is attached strikes the lower part of the loop in the stem of the valve g^2 in the pipe *g*, opening the valve for the passage of steam through the pipe *g* into the lower compartment of the tank *b*, at the same time opening the valve or cock in pipe *l*, and the lower compartment of the tank *b* discharges its store of water into the boiler *a*, through pipes *l* and *k*, and is partially filled with steam from the boiler, and as the water rises in the boiler *a* to a certain height the float *o* is carried up, and the valves l' and g^2 are closed by its movement. Water then descends from the upper compartment and condenses the steam in the lower compartment, producing a vacuum, which is filled with water from the receptacle *c*, and the upper compartment of the tank *b*, and the cock k' being open the boiler is completely filled with water through the pipe *k*.

The fire then being kept up, the operation is repeated continuously, producing an intermittent flow of hot water, through the pipe *e*, the radiator e^3, and pipe *i*, to the tank *b*.

To use the apparatus for heating by steam, the cock f' in the steam-pipe *f* is opened, and the cock e^2 in the water-pipe *e* is closed, and the cock k' is also closed.

Upon rekindling the fire in the combustion-chamber the water boils in the boiler *a*, and the steam generated passes through the steam-pipe *f* into the radiator e^3, expelling the water therefrom into the upper compartment of the tank *b*, when the steam following is condensed by the water there.

When the water has evaporated in the boiler so as to allow the float *o* to descend far enough to open the valves g^2 and l', the boiler will be refilled and the valves again closed by the raising of the float *o*, and the operation is continued, keeping the pipe *e* and the radiator filled with hot steam, and if condense-water accumulates the steam will force it through pipe *i* into the compartment b^1 of the tank *b*.

It will be perceived that in using this apparatus, either for heating an apartment or car, with hot water or steam, its operation is automatic or continuous as long as the fire is kept up.

The valves at the bottom of the pipes *m* and *n* in the tank are held to their places by the spiral spring in the tube *m*, but will be opened when the water is drawn out or expelled by steam from the lower compartments of the tank *b*. The opening in the top of the tank *b* (marked h^2) is used to fill the tank with water, and has a valve opening inward. In the water-pipe *e* there is a valve, e^1, closing toward the boiler. This valve may be placed below the junction of pipe *f*. The weighted valve h^1 in the top of the tank *b* governs the pressure of steam and regulates the overflow of water from the tank.

By the use of this apparatus I am able to secure a saving in heating an apartment or car, and also to place the radiator on a level with or below the floor, and below the apparatus itself, and return the water used to the boiler over and over again with but little if any loss.

The receptacle *c* for overflow of water ma be dispensed with by increasing the capacit of the upper compartment of the tank *b*, so that it will only be necessary to partially fill it with water to supply the apparatus, leaving an unfilled space sufficient to contain all the water which will at any time be expelled from the boiler *a* by the expansion of steam.

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

1. An automatic steam and water heating apparatus consisting of boiler *a*, tank *b*, with receptacle *c*, and pipes *h* and *j*, with the pipes *e*, *f*, *g*, *k*, and *l*, with valves and connections, substantially as described, and for the purposes specified.

2. An automatic steam and water heating apparatus consisting of boiler *a* and tank *b*, with the pipes *e*, *f*, *g*, *k*, and *l*, with valves and connections, substantially as described, and for the purpose set forth.

3. The boiler *a*, in combination with the jacket *d*, substantially as and for the purpose set forth.

4. The tank *b*, with its chambers b^1 and b^2, and pipes *m* and *n*, with their valves, operating as described and set forth.

5. Tank *b*, having compartments b^1 and b^2, and pipes *m* and *n*, with their valves, in combination with a steam-boiler, substantially as described.

6. The combination of pipes *i e* and their valves i' and e^1, with tank *b*, as described, and a steam-boiler and radiator, substantially as and for the purpose set forth.

7. The combination of tank *b*, having compartments b^1 and b^2, pipes *m* and *n*, with their valves, with reservoir *c*, substantially as described, and for the purpose set forth.

IRA A. SALMON.

Witnesses:
S. L. POTTER,
CHS. HOUGHTEN.