J. H. & J. B. CLARK.

Steam Heater.

No. 86,210. Patented Jan. 26, 1869.

Fig. 1.

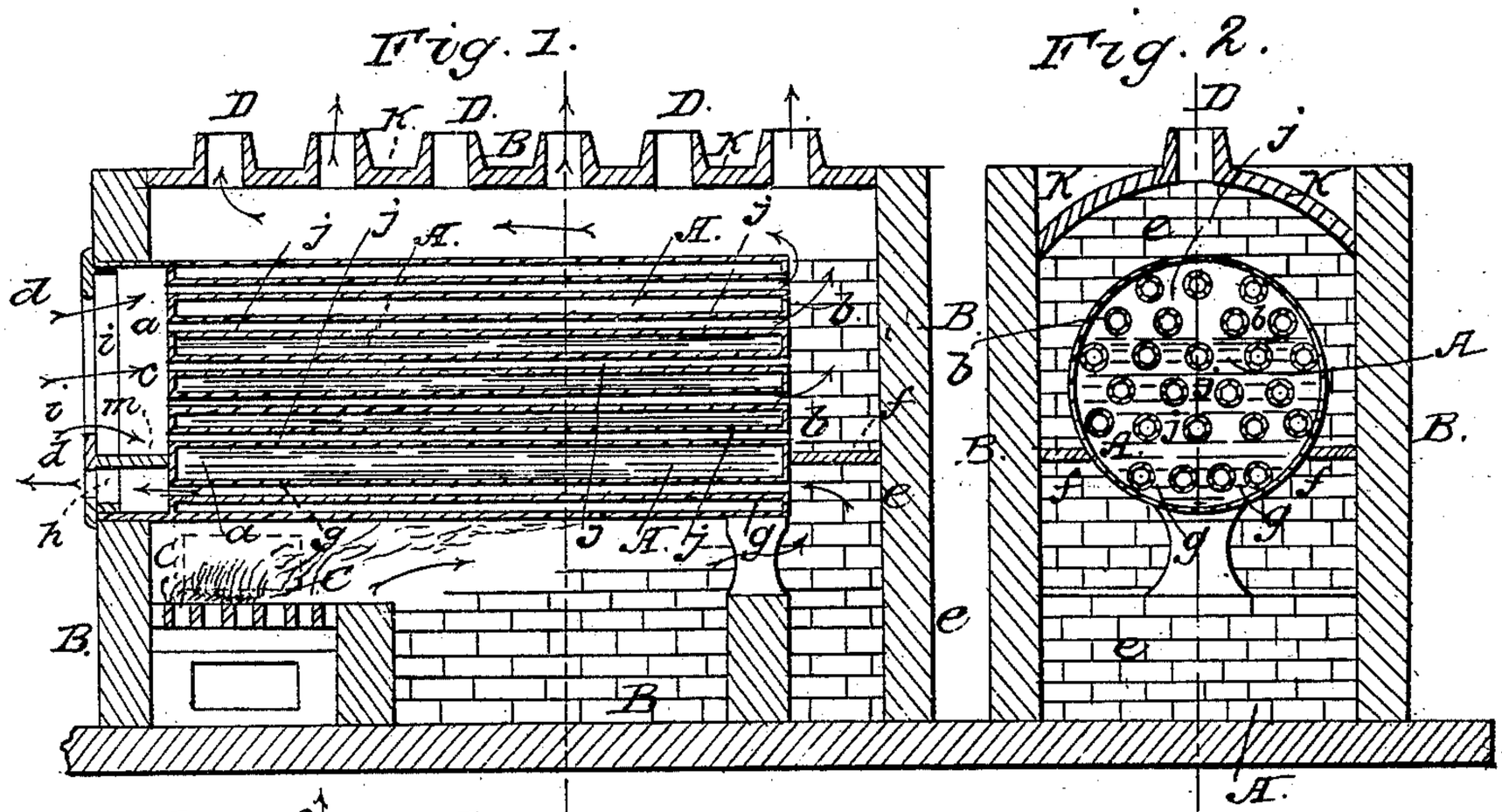


Fig. 2.

Fig. 3.

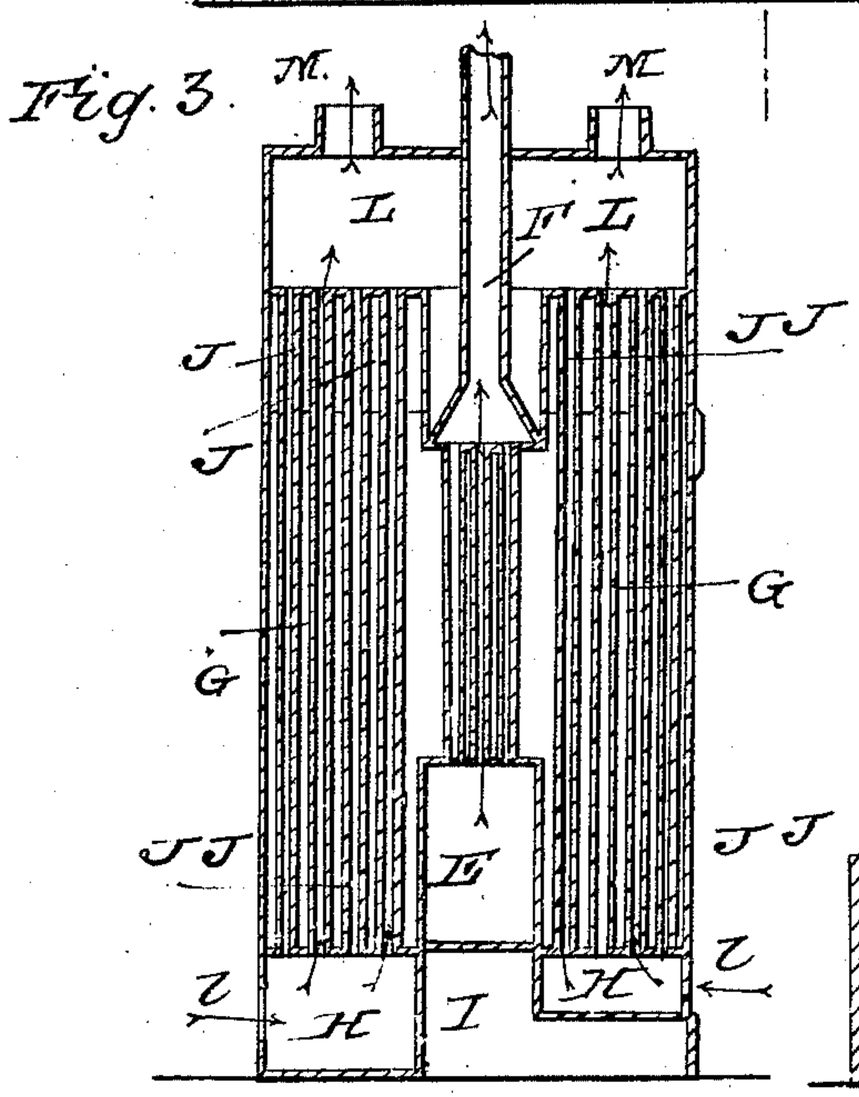
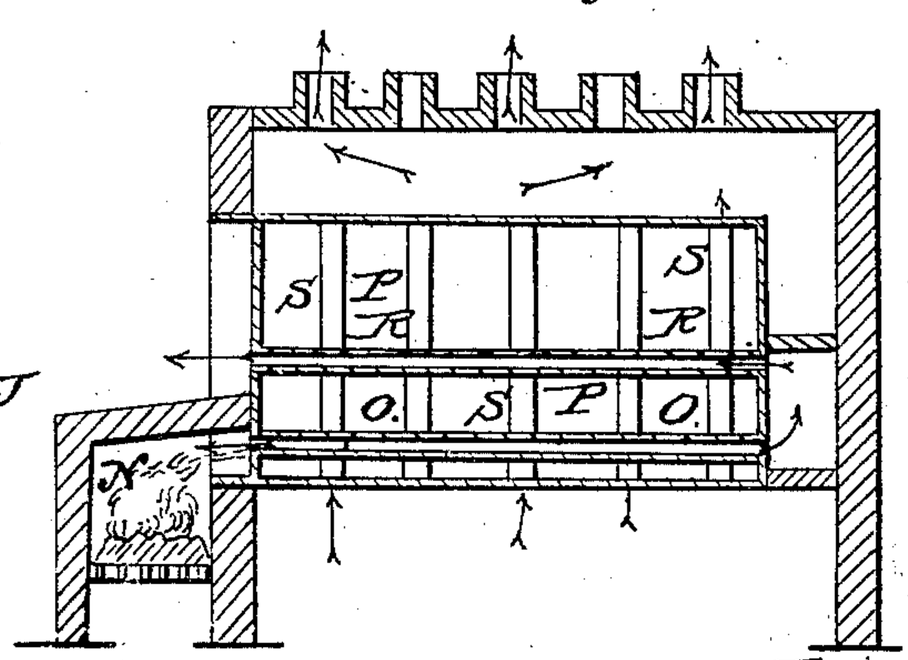


Fig. 4.



Witnesses

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JOHN H. CLARK AND JOHN B. CLARK, OF PROVIDENCE, RHODE ISLAND.

Letters Patent No. 86,210, *dated January* 26, 1869.

IMPROVEMENT IN STEAM-HEATERS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that we, JOHN H. CLARK and JOHN B. CLARK, of Providence, in the county of Providence, and State of Rhode Island, have invented a new and improved Steam-Heating Apparatus; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same; reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a vertical longitudinal section of our improved steam-heating apparatus.

Figure 2 is a vertical transverse section of the same.

Figures 3 and 4 are sectional elevations showing modifications of our invention.

Similar letters of reference indicate like parts.

This invention relates to a new apparatus for heating houses of all kinds, and has for its object, first and chiefly, economy in the use of fuel and in the first cost of the apparatus. Also, to secure the most efficient heating and radiating-surface in a compact and cheap form, as well as safety from accident that could in an ordinary steam-heating apparatus arise from a collection of water in a stack of the radiator. Finally, convenience, by securing a uniform temperature without constant attention.

The invention consists in the construction of an apparatus for applying a steam-boiler to the heating of air by passing the air through the boiler.

The steam and hot water will remain hot for a considerable length of time, and will therefore continue to heat the air that passes through the boiler, even if the fire should be low, or until extinguished.

A, in the drawing, represents a boiler of cylindrical, oval, prismatic, or other suitable form, provided with a series of horizontal tubes that fit through both heads *a* and *b*.

This boiler is set up in a suitable brick or other structure or case B, in a horizontal position, as shown.

It has a forward extension, *c*, in front of the front head *a*, and has this extension closed by a plate, *d*.

Under the boiler is arranged a furnace, in which a grate, *c*, is secured.

The fire is started on the grate after the boiler has been sufficiently filled with water, and the smoke and products of combustion pass back under the boiler, and then up in rear of the same.

Between the rear wall *e* of the brick casing and the rear head *b* of the boiler is, somewhat below the middle height of the boiler, arranged a horizontal partition, *f*, which prevents the smoke from entering the space above the boiler.

The smoke is thereby forced to pass forward through the lower tubes *g g* of the boiler, whence it enters the space between the plates *a* and *d*, which space is, by a horizontal plate, *m*, divided into two compartments, the lower one of which the smoke enters.

The smoke finally escapes through an aperture, *h*, in the lower part of the plate *d*.

The products of combustion are thus caused to pass twice along the whole length of boiler, and will therefore sufficiently heat the water contained therein so as to generate steam in the boiler.

A safety-valve may be arranged on the latter, to prevent accidents from overheating.

The cold air enters the apparatus through an aperture, *i*, in the upper part of the plate *d*, and then passes into the upper tubes of the boiler. It becomes heated while it passes through these tubes, and enters then the space formed in rear of the boiler, above the partition *f*. It then escapes into tubes D D, which project from the covering-plate *k*, of the structure B, as shown, and is, in these tubes, conducted into the compartments to be warmed.

The nearly constant temperature which the surrounding hot water and steam impart to the tubes *g*, and to the whole boiler, causes a similarly constant temperature of the air, and even if the fire should be reduced or already extinguished, the air will still be heated for a considerable length of time.

Although we claim the aforesaid apparatus as it is described, we still do not confine ourselves to the particular form described, nor to its general arrangement, as the main part of our invention can also be carried out by means of apparatus of entirely different construction.

Thus, for example, an upright boiler, as shown in fig. 3, can be used with almost equal advantage. In it the fire is arranged in an upright vessel, E, and the products of combustion pass off through a smoke-pipe, F.

The water is contained in an annular vessel, G, which surrounds E and F, and the cold air enters, through apertures *l l*, a vessel, H, which surrounds the ash-pan I.

The air passes up through vertical pipes J J, that are arranged through the boller G, and is collected in a chamber, L, whence it is conducted away through suitable pipes M.

In fig. 4 another plan of horizontal apparatus is shown. In it the products of combustion pass from the furnace N through the lower tubes O of a horizontal steam-boiler, P, and thence back through an upper set of horizontal tubes, R.

The air enters the lower ends of and passes up through vertical pipes S that traverse the boiler, as shown, and is thereby heated. It is afterward collected and distributed in a manner similar to that shown in fig. 1.

In figs. 1, 3, and 4, the course of the smoke is indicated by red, that of the air, by blue arrows.

Having thus described our invention,

We claim as new, and desire to secure by Letters Patent—

The combination of the steam-boiler A, which has the smoke-tubes *g* and the air-tubes *j*, with the furnace C, partition *f*, plate *d*, partition *m*, and tubes D D, all arranged substantially as and for the purpose herein shown and described.

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Witnesses:

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