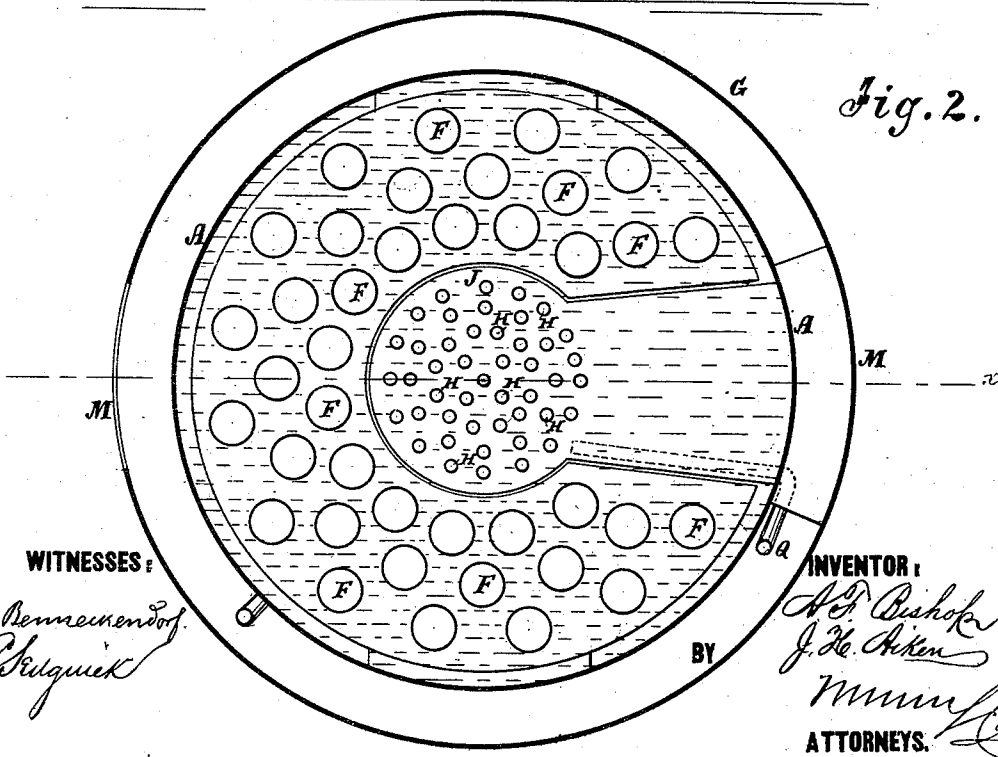
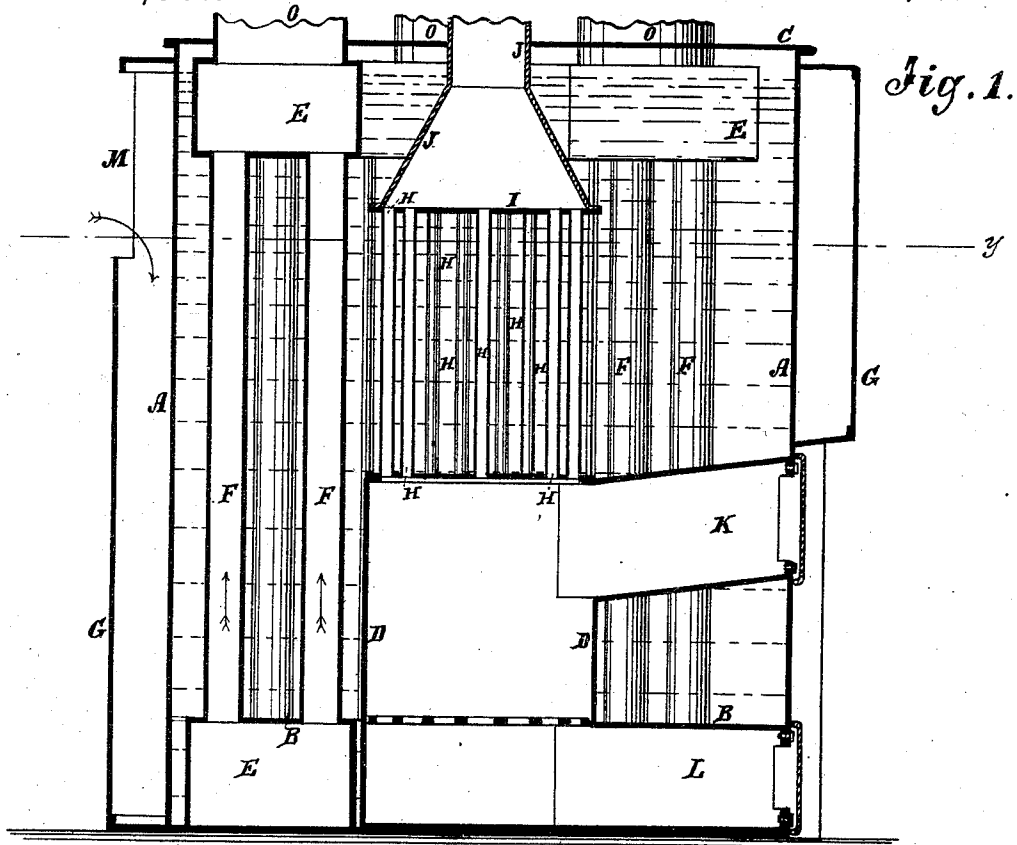


A. F. BISHOP & J. H. AIKEN.

Heating-Furnaces.

No. 155,851.

Patented Oct. 13, 1874.



WITNESSES:

A. Benneken
Chidwick

INVENTOR:

A. F. Bishop
J. H. Aiken

BY

Wm. H. Aiken
ATTORNEYS.

A. F. BISHOP & J. H. AIKEN.

Heating-Furnaces.

No. 155,851.

Patented Oct. 13, 1874.

Fig. 3.

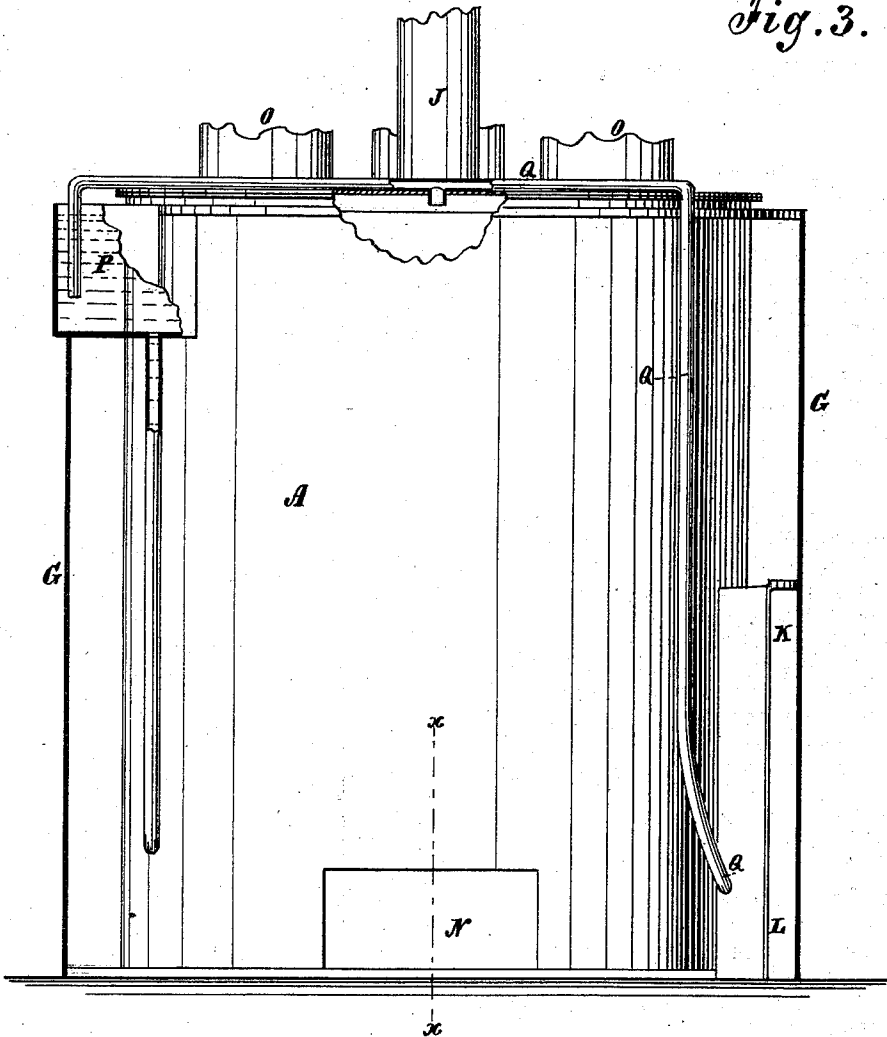
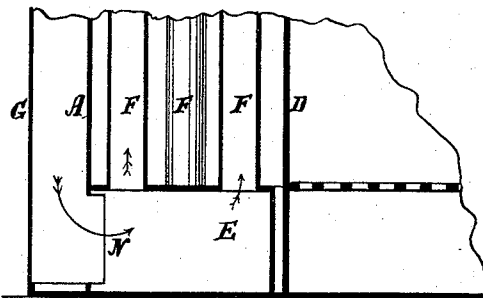


Fig. 4.



WITNESSES:

A. Bennekenhof.
S. Gulquies

INVENTOR:

BY

ATTORNEYS.

UNITED STATES PATENT OFFICE.

ADOLPHUS F. BISHOP AND JOHN H. AIKEN, OF NORWALK, CONNECTICUT.

IMPROVEMENT IN HEATING-FURNACES.

Specification forming part of Letters Patent No. **155,851**, dated October 13, 1874; application filed July 25, 1874.

To all whom it may concern:

Be it known that we, ADOLPHUS F. BISHOP and JOHN H. AIKEN, of Norwalk, in the county of Fairfield and State of Connecticut, have invented a new and Improved Heating-Furnace, of which the following is a specification:

The object of our invention is to provide an improved and efficient apparatus to supply air to inhabited buildings pure and unvitiated and unchanged in all its conditions from its original state, except that it is heated. The said apparatus consists of a boiler, which, for convenience sake, we arrange as vertical in position, and because in a great majority of cases it will be so placed, said boiler containing within air-chambers, generally two in number, and placed at or near the extreme ends of the cylinder, the faces of which (inner and outer) will be concentric rims, parallel to the cylinder of the boiler, and having their remaining sides at right angles to the rims, and generally flat, said chambers being connected by air-tubes (one or more rows of them parallel to the cylinder) extending between the air-chambers all the way round, except in front, where the fire-doors are; and in a considerable central space not occupied by these tubes and chambers, but which is bounded by lines drawn across the inner faces of the chambers, is placed a furnace or fire-pot, and an ash-pit beneath, the latter extending to, or nearly to, the floor, and above the furnace, and of the same, or nearly the same, horizontal dimensions as the latter, is placed a smoke-chamber, which will be contained wholly within the cylinder, or may extend above and through it, from which the smoke-pipe will proceed to the chimney-flue. The roof of the furnace consists of a flue-sheet, out of which will rise fire-tubes, which will connect the furnace with the smoke-chamber. The furnace, air and fire tubes, air and smoke-chambers are water-tight.

The air-chambers will, preferably, be placed a little off from the cylinder, to admit of free water circulation; but their exterior rims may be against, or be one and the same with the cylinder-sheet, in which case tubes may be inserted at a few points through the air-chambers, terminating in the upper and lower plates of the same to aid circulation.

As many air-chambers, like the two described,

as may be found useful may be placed at distances apart between the upper and lower chambers. These, though increasing the cost of construction, will augment the reservoir capacity, or capacity for storing air, and admit of a slower transmission of the air, by which it will acquire more heat and volume. The air and fire tubes will be sufficiently apart to permit an easy circulation of the water between, around, and among them.

To further facilitate the water circulation a few outside pipes may be used to enter the boiler at or near the top and bottom.

As a means of further heating the air we propose, in some cases, to surround the cylinder with a metal case or wall to be closed at the top against the sides of the cylinder, and thus create a chamber of a few inches width, into which the air will be first received. From this chamber the air will enter through the cylinder into the lower air-chamber at one or more points, whence it will rise through the air-tubes to the upper air-chamber, and through the intervening ones, if they be used, and thence to the register-pipes. Water will fill all spaces within the boiler not occupied by chambers, tubes, and furnace, and will be supplied through means of any sufficient self-operating arrangement connected with the pipe system of the building, or in towns where there is no public water it will be supplied by any practicable means.

As water will be the only immediate heating agent no steam pressure will ever be generated, as the steam will have unobstructed exit by means of a pipe which will convey it beneath the grate, or to a condenser, or in part to the air-chambers, to supply moisture to the air.

Each complete apparatus will be subjected to hydrostatic pressure to prove perfect construction.

The fire-tubes may be readily swept by lifting off a cover provided over them.

When repairs are needed the apparatus will be laid on its side, and furnace, fire-tubes, and smoke-chamber, constituting the fire-section on the air-chamber, and air-chambers be drawn out to afford access to the interior.

Figure 1 is a sectional elevation of our improved water air-heater, taken on the line *x x*

of Fig. 2. Fig. 2 is a horizontal section taken on the line *y y* of Fig. 1. Fig. 3 is a section of the outer air-jacket, the feeder, and a portion of the top of the boiler; and Fig. 4 is a sectional elevation of Fig. 3 taken on the line *z z*.

Similar letters of reference indicate corresponding parts.

A is the outside shell of the boiler; B, the bottom; C, the top; D, the shell around the fire-pot; E, the air-chambers; F, the air-tubes; G, the outer air receiving-jacket; H, the fire-tubes; I, the tube-sheet at the base of the smoke-flue; J, the smoke-flue; K, opening to fire-pot; L, opening to ash-pit; M, inlet for cold air; N, inlet for air to lower chambers; O, conductors for hot air; P, feed-tank; and Q, pipe for conducting steam, in case any is generated, into the fire to be burned, or into the feed-tank to be condensed. This feed-tank will contain a float-regulator and a valve for maintaining the water at the proper height in the boilers. The air-chambers E and tubes F are fitted in the boiler and around the furnace

and the heat-circulating tubes, so that, by removing the top C of the boiler, they can be readily lifted out to allow of getting inside the boiler to repair the furnace in case of need.

The smoke-pipe J can be readily unbolted from the tube-sheet I, and taken off for cleaning out the fire-tubes.

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

The combination of the concentric air-chambers E, the connecting air-pipes F, the centrally located fire-pot, the smoke-chambers J, the connecting fire-tubes H, the all-embracing water-reservoir A, and the outer enveloping-jacket G, all constructed and arranged substantially as shown, and for the purpose described.

ADOLPHUS F. BISHOP.
JOHN H. AIKEN.

Witnesses:

CHARLES L. GLOVER,
WILLIAM E. MONTGOMERY.