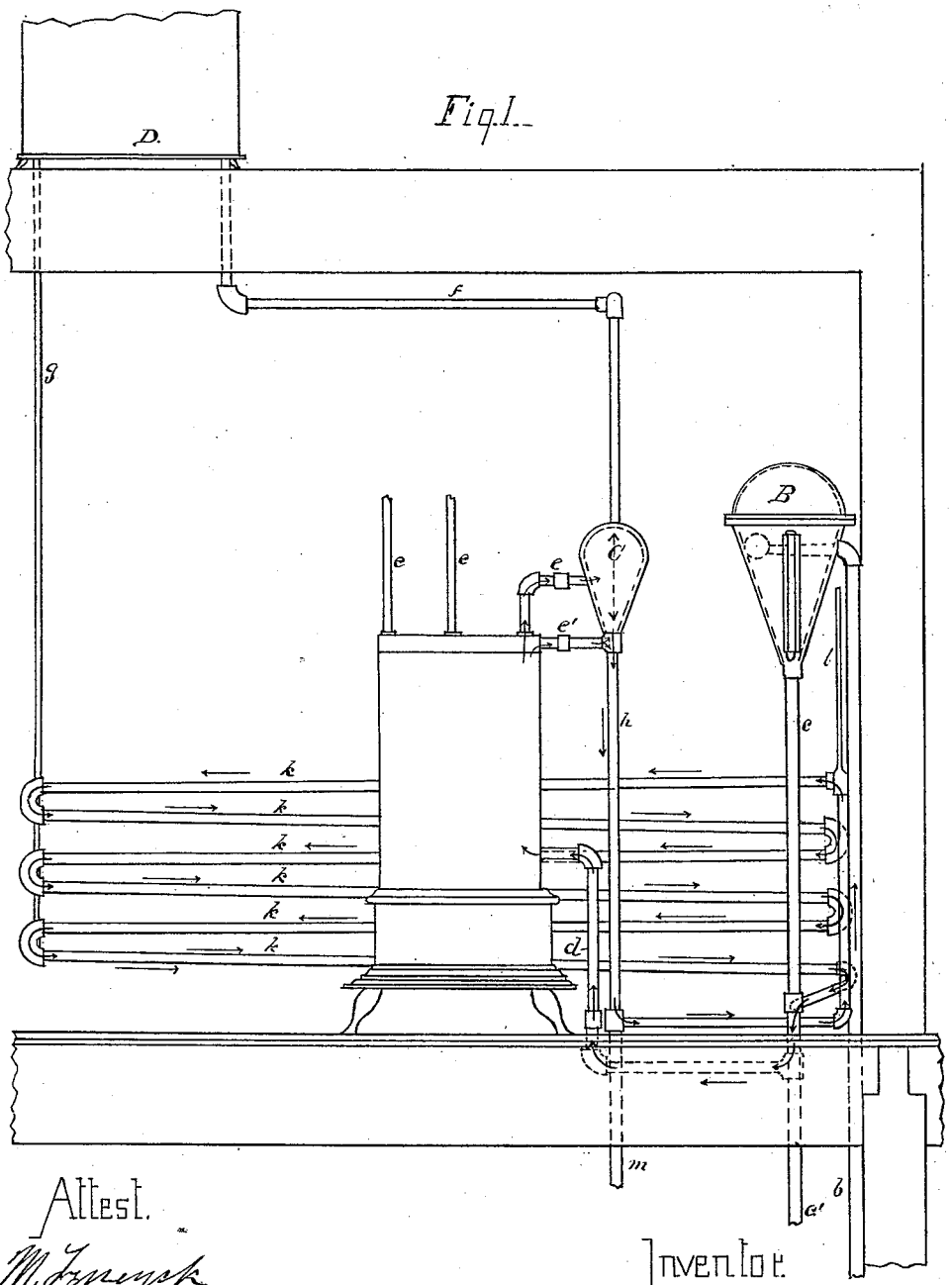
2 Sheets—Sheet 1.

J. JOHNSON.

Apparatus for Heating Buildings.

No. 207,422 **Patented Aug. 27, 1878.**

Fig. 1.



Attest.

M. Zmeyk

S. E. Harding

Inventor.

Jonathan Johnson

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Fig. II

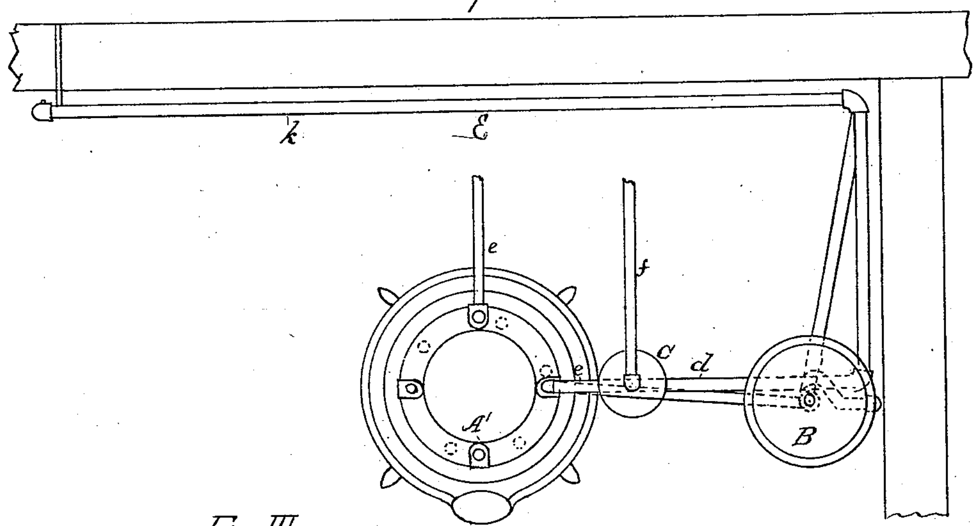


Fig. III

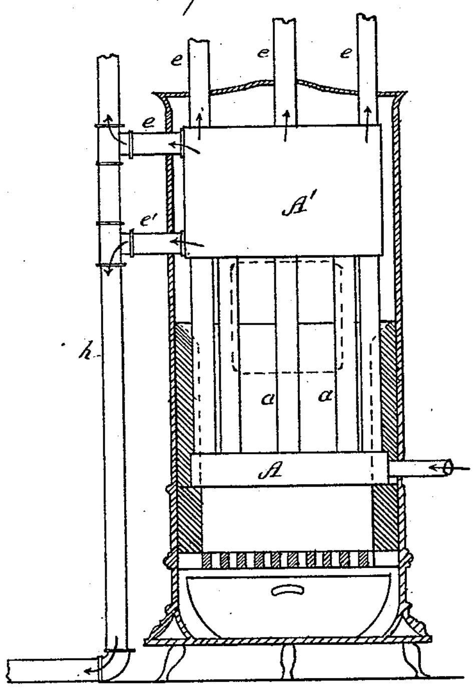
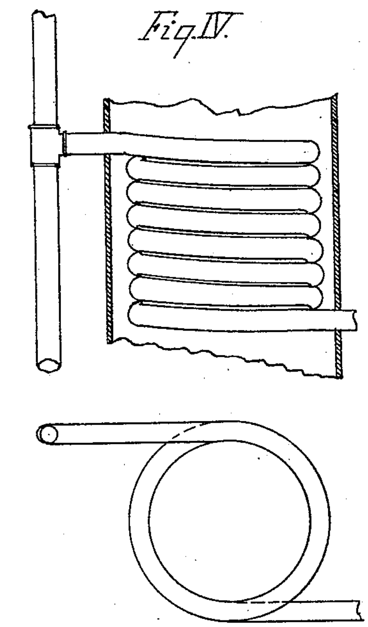


Fig. IV



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S. E. Harding

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Jonathan Johnson

UNITED STATES PATENT OFFICE.

JONATHAN JOHNSON, OF LOWELL, MASSACHUSETTS.

IMPROVEMENT IN APPARATUS FOR HEATING BUILDINGS.

Specification forming part of Letters Patent No. **207,422**, dated August 27, 1878; application filed June 13, 1878.

To all whom it may concern:

Be it known that I, JONATHAN JOHNSON, of the city of Lowell, county of Middlesex, and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Heating Buildings by Water and Steam, of which the following is such a full and exact description as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, forming a part of this specification, in which similar letters indicate corresponding parts in the different figures.

This invention is especially designed as an improvement upon the steam heater and apparatus for which a patent, No. 157,608, was granted to me on the 8th day of December, 1874; and consists in the construction and combination of the different parts constituting the apparatus, as will be hereinafter fully described, and then specifically pointed out in the claims.

Figure 1 of the drawings is a side elevation of the heater and circulating apparatus applied to a building. Fig. 2 is a plan of the heater and a portion of the circulating-pipes and other devices, also shown as in a building ready for use. Fig. 3 is a vertical section of the heater, showing the arrangement of the pipe-coil with relation to the fire-pot. Fig. 4 shows a modification of the circulating apparatus, arranged in a slightly different manner for accomplishing the same result.

The heater is constructed in a manner similar to that described in the Letters Patent heretofore named; but I prefer to place the hollow annular ring or reservoir A, which forms the water-receiving reservoir of the heater, and is connected by the vertical tubes *a a* with the ring A′, above the fire-pot, in order to relieve the fuel from the chilling contact of the pipes filled with the comparatively cold water as it enters the reservoir A, the fire-pot being lined with fire-brick or thick plates of cast-iron, which retain and prevent side radiation of the heat, thus enabling the fire to be kept in much better condition than would be possible were the fuel directly against the water-containing portion.

The supply of water for the apparatus is received from any outside source which gives sufficient pressure through the pipe *b*, and conducted to the regulating-tank B, containing a valve operated by a float in the ordinary manner, which governs the supply automatically. From this tank the pipe *c* passes downward, and may terminate in a cock at *c′*, by which the water can be drawn from the apparatus when desired. Connected to the pipe *c* at any suitable point is the pipe *d*, from which the water passes into the reservoir A of the heater, thence upward through the tubes *a a* to the reservoir or ring A′, and from this by an eduction-tube, *e*, to the separating pipe-chamber C.

It is well known that water may be heated under pressure and in a confined space above the boiling-point without being converted into steam; but when the pressure is removed, or the space enlarged, it, or a portion of it, instantly becomes steam and fills the vacant space. It is therefore apparent that when the water in the tank or chamber C reaches the level of that in the supply-tank B it will rise no higher, as through the intercommunication of the circulating-pipes it meets the equal pressure from above. The vacant space in the tank, pipe, or chamber C will therefore be instantly filled with steam of a heat corresponding to the pressure of water under which the apparatus is working. This steam is then conducted through the pipe *f* to the steam-heating coil D, after passing through which it returns as condensed steam or water through the pipe *g* to the water-circulation below, hereinafter to be described.

It is evident that as many eduction-pipes *e* for carrying steam from the heater to heating-coils in different parts of a building may be employed as is needed, or the heater has power to supply. The pipe *e′*, which leaves the reservoir A′, and connects with the pipe *h* below the tank C, serves to make a direct connection between the heater and the hot-water circulation, which traverses back and forth through the pipes *k* upon a constantly descending plane until it discharges into the supply-pipe *c*, and through it is returned to the heater, thus forming a complete steam and water circulation. An additional draw-off cock and pipe, *m*, may be placed at the lower end of the pipe *h* to assist in emptying the apparatus when necessary, and suitable vent-pipes *l* may be

attached to the water-circulation wherever needed.

In the drawings, the heating-furnace is shown as located upon the same floor as the water-circulation, all above being heated by steam, but it will be evident that, were the heating-furnace placed one or two stories below the separating tank or chamber and regulator, the heat could be carried up to that point by the water-circulation, and to all points above it by the steam. Further, in case a less degree of heat is required than would be given out by the steam and water heated to the steam-producing point, the whole circulation may be readily converted into a hot-water circulation instead of one in which both steam and hot water are used, and by regulating the fire and flow of water as small an amount of heat as could be required under any circumstances may be imparted to the air of the rooms.

The modification shown in Fig. 4 of the drawings shows an arrangement somewhat more simple than that heretofore described, but possessing substantially the same general features and producing the same results. For separating the steam from the water I have shown a tank, C, which I prefer, although a pipe of uniform size may produce the same result.

In using this apparatus a great saving of radiated heat is gained over the common hot-air furnace or steam-boilers, heating wholly by steam-coils, and it may be applied to and act in connection with the hot-air furnace, or even ordinary stoves, by introducing a heating-coil or other water-heating device over the fire.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent, the following:

1. The combination of the steam-radiator D and hot-water radiator K, provided with the open-ended tube *l*, with the connecting-pipe *g*, substantially as shown and described.

2. The combination, as described, of the separating tank or chamber with a regulating-tank and their connections with each other, and with the steam and water radiators, substantially as and for the purpose specified.

3. In a heating apparatus, the combination of the water-heating furnace with the regulating-tank B, separating tank or chamber C, steam-coils D, water-coil E, and their several connections, substantially as set forth.

In testimony that I claim the foregoing as my own I hereunto affix my signature in the presence of two witnesses.

JONATHAN JOHNSON.

Witnesses:
JOHN H. MCALVIN,
HENRY J. MCALVIN.