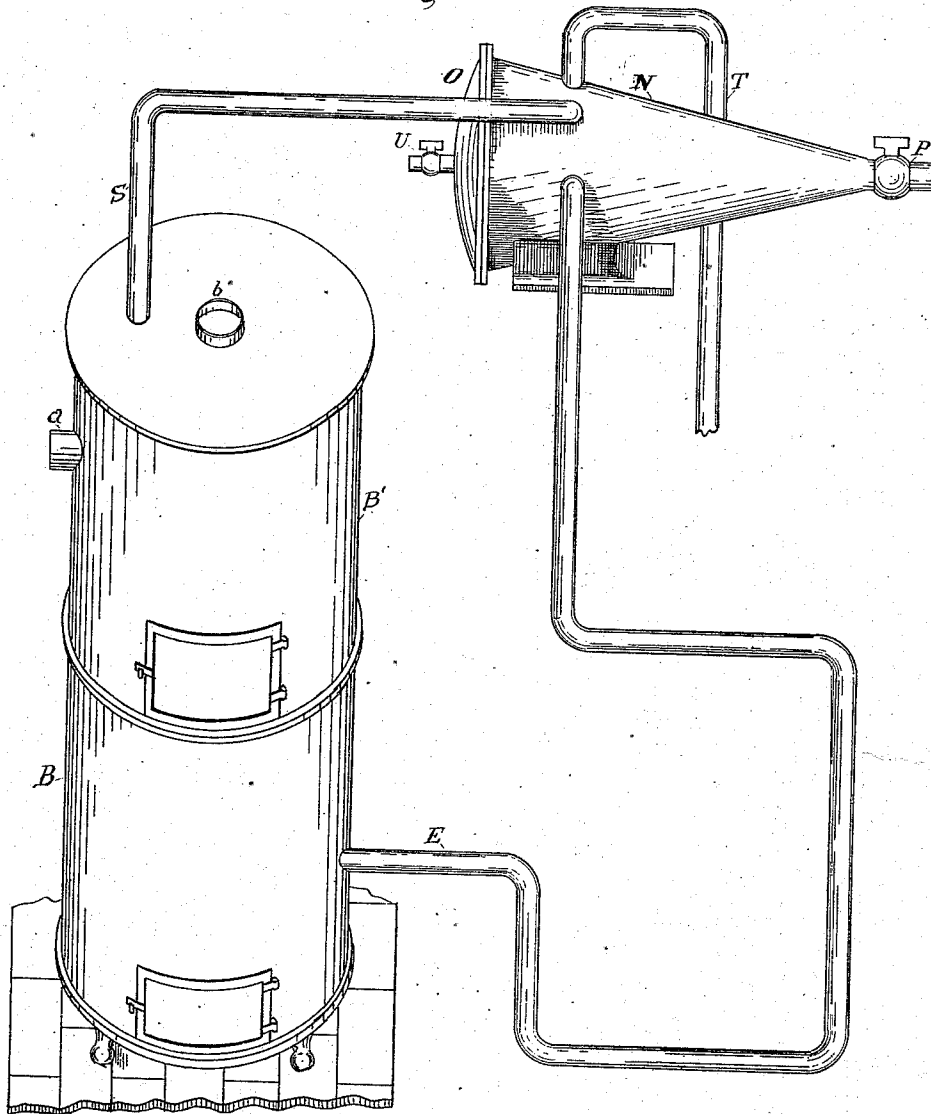


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Hot-Air Furnaces.

No. 157,608.

Patented Dec. 8, 1874.

Fig. 1



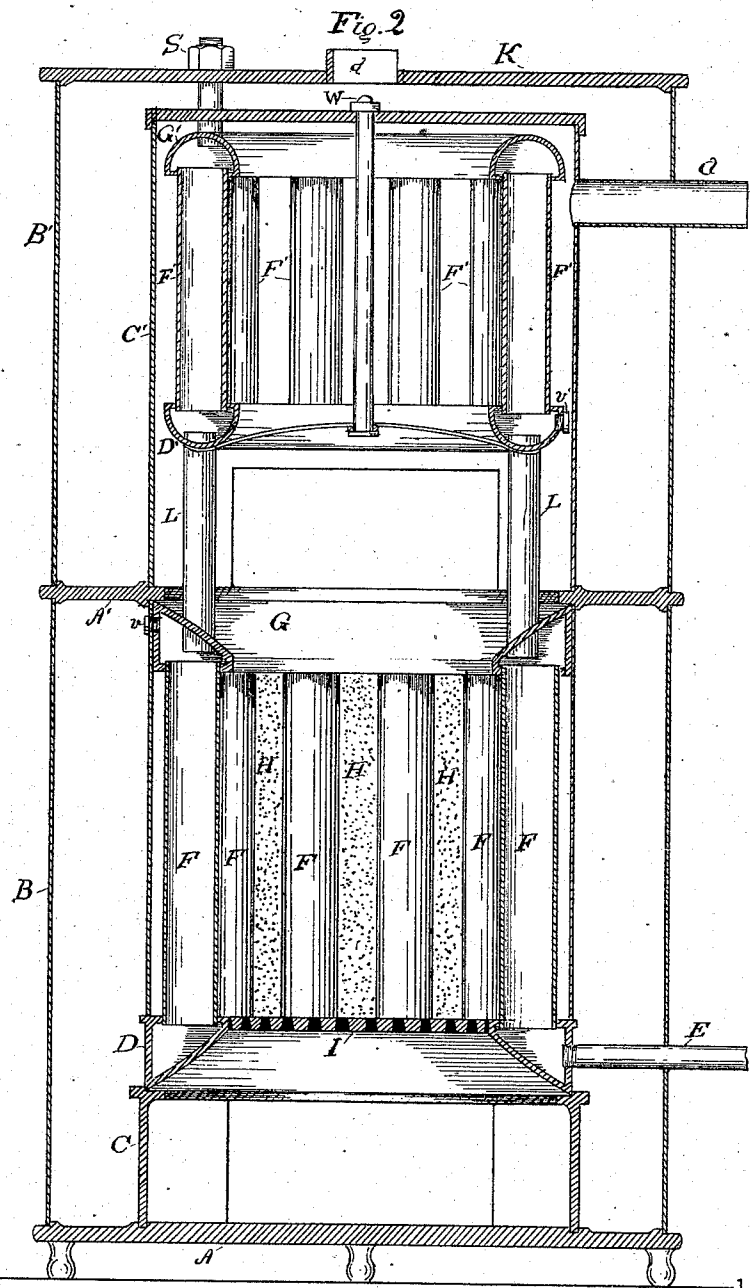
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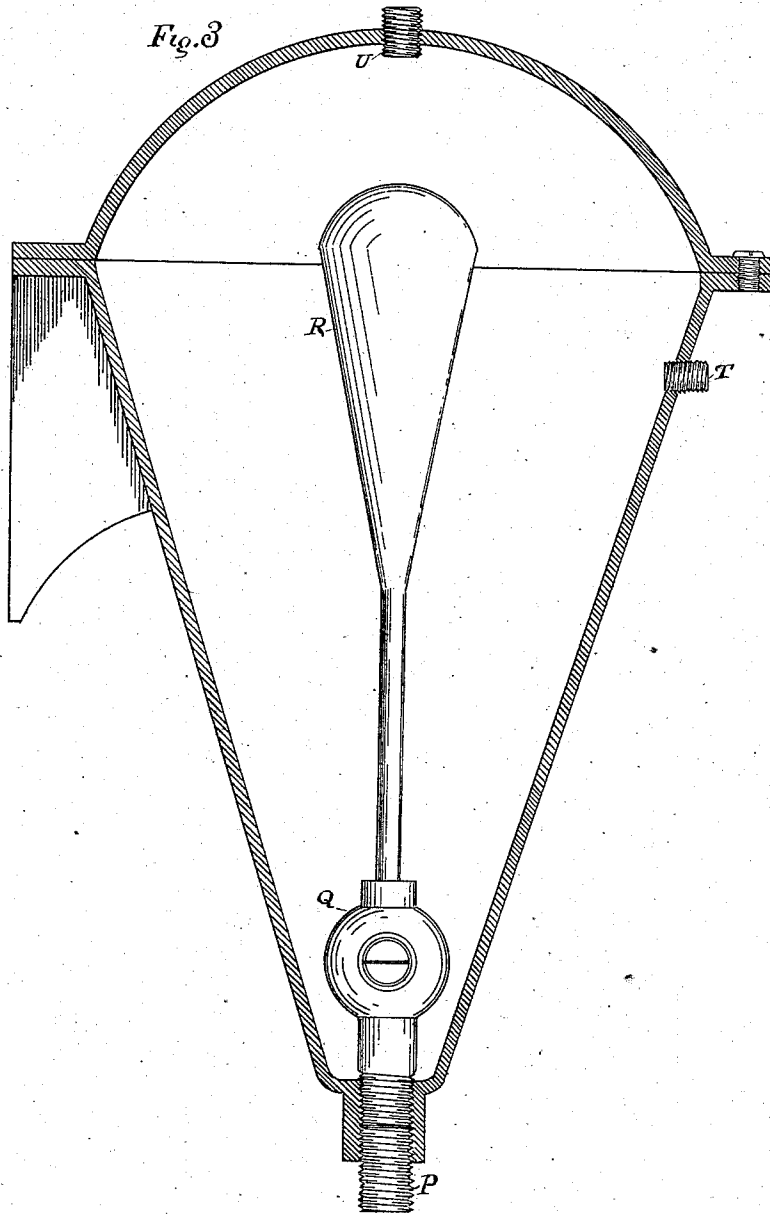
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Fig. 4

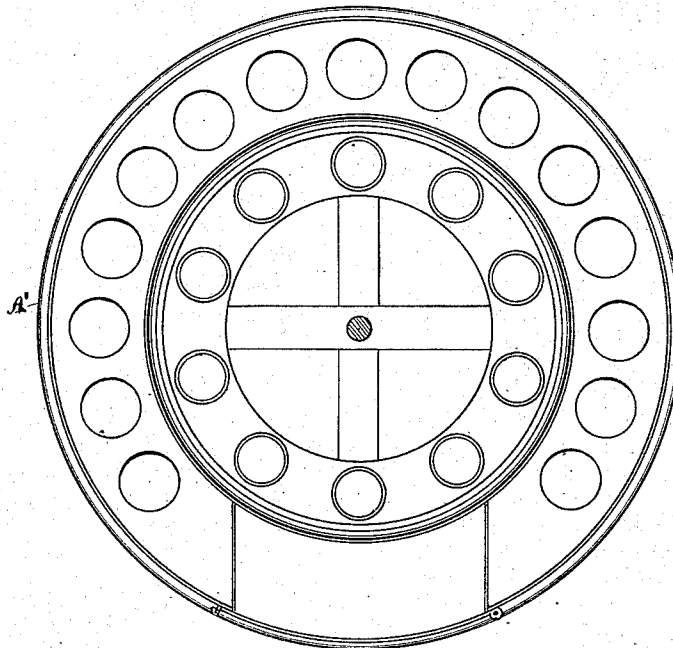
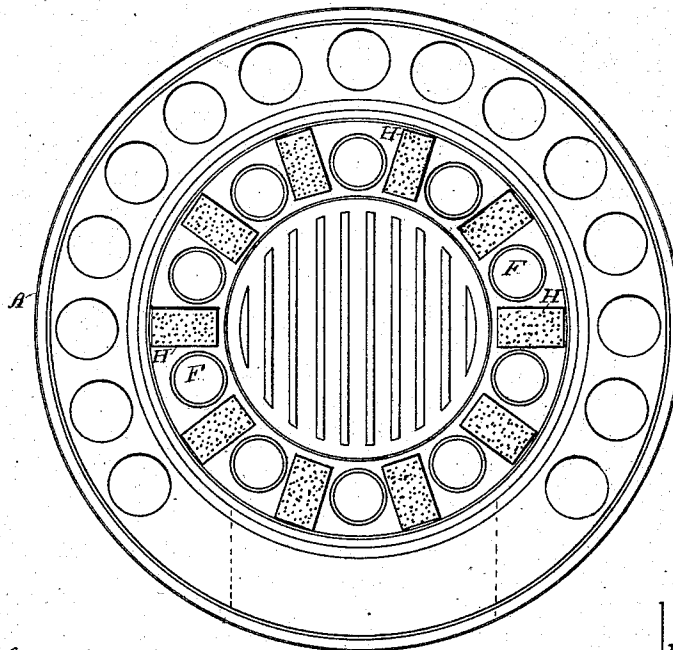


Fig. 5



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UNITED STATES PATENT OFFICE.

JONATHAN JOHNSON, OF LOWELL, MASSACHUSETTS.

IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. **157,608**, dated December 8, 1874; application filed September 28, 1874.

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 Heating-Furnaces; and I do hereby declare that the following is a clear, full, and exact description thereof, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention relates to that class of furnaces commonly termed steam or water heaters, in which the heat of the burning fuel is principally applied to the heating of water, which in its turn heats the air used in warming apartments, either by passing the air directly through the furnace in contact with the heated pipes and reservoirs, the air being admitted at the bottom and passing upward and around the furnace, between the inner and outer cases, becoming sufficiently heated for warming purposes without coming in contact with any surface of metal so heated as to vitiate the air, and cause danger to those who inhale it from the abstraction of a portion of its oxygen, thus giving a pleasant, healthy atmosphere, with sufficient warmth to the apartments into which it may be conducted; or heat is imparted to the air of the rooms by radiators from the pipes and reservoirs as they are carried through different parts of the building.

The object of the invention is to improve the above-named class of heating-furnaces, so as to avoid the vexatious trouble caused by the burning out of water-pipes and reservoirs, owing to the difficulty experienced in keeping up a uniform supply of water, thus causing an unsteady current through them, and, further, by the peculiar construction of the fire-pot, preventing the deposit of clinkers upon its sides, which soon renders the furnace of ordinary construction almost useless; and it consists in the method of construction, as well as the arrangement, of the various parts of the apparatus for heating the air and water, and controlling the circulation of the same, as will be hereinafter set forth, and then pointed out in the claims.

In the accompanying drawings similar letters of reference indicate corresponding parts in the different figures.

Figure 1 is a view, partly in perspective, showing the general arrangement of the furnace, air and water pipes, and regulator, with its connections. Fig. 2 is a vertical section of the furnace, showing the arrangement of the water-columns, annular reservoirs, and fire-brick linings of the fire-pot. Fig. 3 presents a section of the regulating device, showing the internal arrangement and its various connections. Fig. 4 is a horizontal section between the fire-pot and supplementary or dome heater. Fig. 5 is a horizontal section through the fire-pot.

By referring to the accompanying drawings, a base-plate, A, will be seen resting upon appropriate supports, and provided with channels or projecting flanges for the purpose of retaining in position the outer case B and inner case C, the latter forming the sides of the ash-pit, and sustaining the annular hollow reservoir, D, which is connected, by the pipe E, with the regulator through which water is supplied to the furnace. This reservoir D is connected, by a series of hollow columns or pipes, F, with the annular reservoir G, which is formed in a similar manner to the lower one, D, but is placed in a reverse position, so that its inclined surface shall form no lodging-place for the coal when the fire-pot is to be replenished with fuel. Between these columns or pipes F are placed the fire-bricks H, having an elongated rectangular shape, of nearly the same form and size as the space they are to occupy, but leaving sufficient room between them and the columns for the passage of the flame and heat, so that all portions of the surface of the columns shall be exposed thereto. A grate, I, is placed within the annular base D, and operated in any of the various ways known in the art. This arrangement forms a fire-pot possessing many advantages, it being found by experience that the intermixing of the water-tubes with the fire-brick keeps the temperature of its sides so low as to prevent the adhesion of clinkers, and at the same time prevent the deadening effect of a water-jacket wholly surrounding the fire-pot upon the fuel, causing an imperfect combustion of that portion of the fuel adjoining the jacket, with its accompanying evils, such as the escape of unburned gases, ineffective heating-surface, and the continual care requi-

site to keep the fire from going out. On the same plane as the upper surface of the annular reservoir G is a perforated plate, A', which forms the base, upon which is raised the superstructure, consisting of the outer case B' and inner case C', the whole being covered by the plate K, thus forming a dome-heater, and containing the series of water-columns F', connecting the two annular reservoirs, D' and G', the lower one of which is connected with the reservoir G by the pipes L, any desired number of which may be used, so arranged as not to interfere with the opening for the introduction of fuel. This forms an additional heating-chamber, from which the heated water and steam pass through the pipe S to the different reservoirs or coils of pipe from which the heat is radiated, and finally reaches the regulator N. This regulator and supply-tank may be placed at a level above that of the furnace by the introduction of a common check-valve, or at a level above the upper circulating-pipe without a valve, and is constructed as follows: A conical vessel, having suitable stands upon which it rests, and by means of which it may be secured in position, is provided with a head, O, secured to the cylinder by a water-tight joint, formed by a gasket of rubber or other suitable material inserted in the joint, and also having an inlet-pipe, P, coming from any suitable source of water-supply, attached to its small end, and entering its interior to a sufficient distance to allow of the insertion of a valve or cock, Q, to which is attached the float R. It will be evident that, should the water within the tank fall below a certain predetermined line, the falling of the float will open the cock and admit a supply from without; but this is only necessary so far as to supply wastage, as the water passing out of the regulator through the pipe E, which enters it below the water-line after circulating through the furnace, is returned to it through the pipe S, this circulation being caused by the well-known fact, that heat causes water to rise. It, being heated in passing through the furnace, rises through the pipe S and its various connections, but, losing a portion of its caloric through radiators, descends through the regulator and pipe E to the furnace again, thus completing the circuit. A waste-pipe, T, enters the top of the regulator, and serves to carry off any surplus of water or steam which may accumulate therein. A cock, V, is also inserted for the purpose of supplying at all times hot water for culinary or other purposes.

It will be observed that this arrangement allows no more water to enter the circulation than is absolutely needed to keep up the supply, thereby utilizing, as far as possible, all the heat.

It will be seen when, in order to economize space, or for other reason, it becomes necessary

to dispense with the heating-dome and its appendages, the pipe S may be connected with the annular reservoir G by removing the plug V, and screwing the pipe into the orifice closed by it; and, in like manner, should it be desired to attach the water-circulation to a furnace already in use, the dome-heater may be placed in position, leaving the fire-pot of the furnace intact, the connection of the inlet-pipe E being made by removing the plug V' and putting the inlet-pipe in its place. When used in this way, the annular reservoir and pipes forming the heater may be supported by the rod W, provided with a spider at its lower end, upon which the reservoir D' rests, and having a screw-nut at its upper end, by which it is suspended from plate K', which rests upon the inner casing C'.

A pipe for the exit of the smoke is shown at a, but may be differently located, if desired.

The base-plate A is perforated with a series of openings, similar to those in the plate A', for the passage of the cold air entering the furnace, which, as it is being heated, ascends through the annular space between the outer and inner cases, and, finally, makes its exit through the opening b at its top.

The operation of the devices herein enumerated will be readily understood from the description and drawings; but their great superiority in service, caused by the simplicity and absence of liability to derangement of the various parts over other arrangements for a similar purpose, becomes fully apparent when the apparatus is put into actual use.

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

1. In a heating-furnace, a fire-pot lining composed of alternate water-columns and fire-bricks, with spaces between for the passage of flame and smoke, substantially as herein described.

2. The combination, in a heating-furnace, of a dome-heater composed of the annular reservoirs D' G' and the pipes F', the whole being suspended within a metallic case surrounded by an inclosed air-chamber, as set forth.

3. In a heating-furnace, a fire-pot lining composed of alternate water-columns and fire-bricks, in combination with an inner and outer metallic shell, having an air-space between them, and a dome-heater composed of the annular reservoirs and connecting-pipes, as and for the purpose specified.

In testimony that I claim the foregoing I hereunto set my hand this 18th day of September, 1874, in the presence of two witnesses.

J. JOHNSON.

Witnesses:

ANDREW F. JEWETT,
JOHN P. VARNUM.