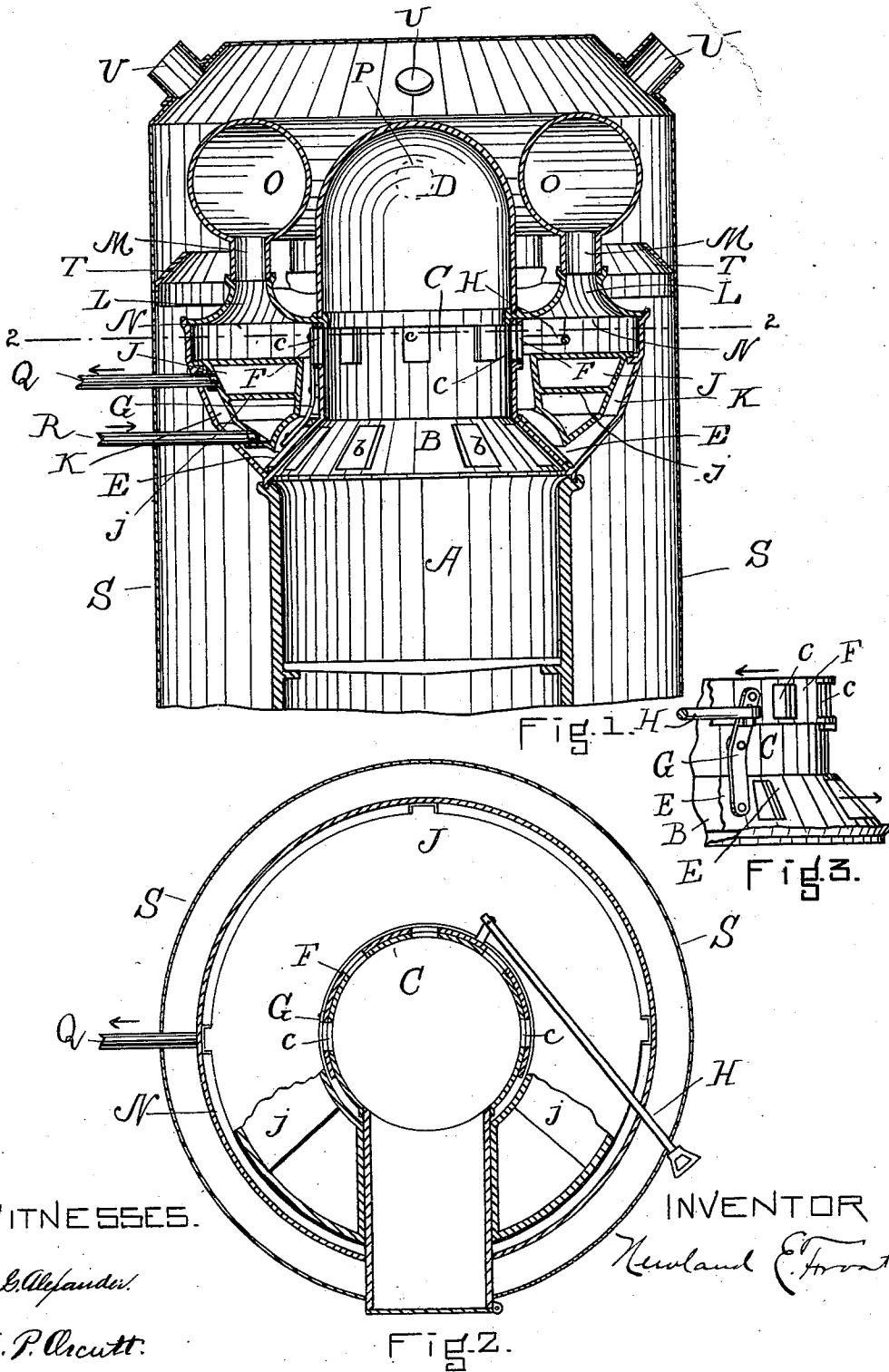


(No Model.)

N. E. FROST.
HEATING APPARATUS.

No. 563,368.

Patented July 7, 1896.



WITNESSES.

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HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 563,368, dated July 7, 1896.

Application filed October 28, 1895. Serial No. 567,062. (No model.)

To all whom it may concern:

Be it known that I, NEWLAND E. FROST, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Heating Apparatus, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention combines in one structure means for house-heating by hot-air circulation with a hot-water-circulation apparatus operated by the same fire, but located wholly outside of the fire-pot and controlled by a damper or heat-deflecting device serving to modify the force of the caloric current and its action on the water to be heated. Above the central fire-pot is a dome or flame-space surrounded by an annular air-chamber through which the air to be heated passes upwardly and inwardly over the dome into the space inclosed by the external jacket and thence through hot-air pipes to the rooms to be heated thereby. The flames and volatile products of combustion escape from the dome at points below the hot-air chamber, and rise outside of the dome through a circularly-arranged series of passages to a hollow top of annular form, from which the smoke-pipe leads to the chimney. The flame-outlets from the dome and fire-pot are lateral openings through the fire-pot wall or the narrowed neck thereof, and formed in two tiers or ranges near its upper edge. A partially-rotatable damper made in one piece or in two connected parts surrounds these openings, so arranged as to close either the upper or lower series, and by a partial rotary movement to open the closed outlets and close the open ones. A suitable antifriction device may be provided to ease the movement of this damper. A water-chamber of curved form is located just outside of the damper in the smoke and flame-space to which the two series of openings lead. When the lower outlets are open, an intense current direct from the fire impinges against the lower part of this water-chamber, imparting great heat thereto; but when these are closed and those of the upper tier opened the heat is lessened, the current passing mainly over the top of said chamber. Suitable lugs support the water-chamber, so that there is a free passage both sides of it for the caloric current. A horizontal or other

longitudinal partition runs or may run through said chamber, the flow-pipe extending from one side thereof and the return-pipe entering the other, so as to insure a proper circulation therefrom to the radiators in the rooms to be water-heated. Instead of one chamber with partition there may two connected chambers with a flame-space between them to increase the amount of heating-surface.

In the drawings, Figure 1 is a vertical section through a house-heating furnace constructed according to my invention. Fig. 2 is a horizontal section thereof on line 2 2 of Fig. 1. Fig. 3 is a detail of the twin dampers.

A is the fire-pot, made of any suitable shape and provided with a grate of ordinary character. The walls of the fire-pot may be substantially vertical, but for the purposes of my invention I prefer the form shown in Fig. 1, where they slope inwardly at and above the fire-level, as at B, and then extend vertically upward as a cylindrical neck C. This neck and the frusto-conical part B are preferably independent of and cast separately from the base or lower part of the fire-pot.

The dome D, over the fire, is supported upon the upper edges of the neck C and is heated by the flames and smoke rising therefrom and by radiation from the incandescent body of fuel. The flames and smoke escape from the fire-pot, laterally, through two series or horizontal ranges of openings *b* and *c*, formed through the inclined and vertical portions B and C.

I provide a partially-rotatable damper, or preferably two such dampers E F, connected for simultaneous reverse movement, whereby when one range of openings, as *c*, is closed the other, as *b*, is opened, thus deflecting the burning gases from the upper to the lower series or conversely. When a single damper only is provided covering both series of apertures, the closed and open spaces are so arranged that its movement will open one series when it closes the other. When two separate dampers are employed, I connect them by a centrally-pivoted lever G, engaging both dampers, and I extend outwardly from one end of said lever an operating-rod H, which, by a slight pull or push, gives to both dampers the limited movement required. (See Fig. 3.)

Surrounding the parts B and C and the dampers E F is a curved water-chamber J, inclosed by an outwardly-extending shell K, which rests at its foot upon the fire-box A and is provided with a cover L, having a series of pipes M leading upwardly from the gas-burning flame-space N, surrounding said water-chamber, to a curved or annular smoke-drum O. From this drum the volatile products of combustion pass to the chimney through pipe P. The water-chamber J is thus located immediately in the path of the caloric current escaping from the fire-pot through the lower series of openings *b* and just below the upper current emerging through ports *c*, and the movement of the dampers above described opens the one series or the other, imparting a high degree of heat or a more moderate temperature thereto, as will be understood. The direct current passes upwardly at each side of the water-chamber, and the other one passes mainly over its top. The drawings show a horizontal partition *j* through the chamber J nearly to its ends, with the flow-pipe Q running from one side and the return-pipe R entering the other side to insure circulation. The partition may be vertical instead, or the chamber be composed of two parallel continuously-connected hollow shells with a flame-passage between them to increase the heating-surface.

A sheet-metal or other jacket S incloses the entire apparatus. Cold air is admitted in the usual way at the lower part of the inclosed space and rises in contact with the dome D, the shell K with its cover L and pipes M, and with the smoke-drum O. An oblique deflector T, attached to the jacket S, may throw the current mainly inward between the dome and the smoke-drum. Hot-air pipes U lead from the upper part of the jacket to the room to be heated by hot air.

I claim as my invention—

1. In a heating apparatus, the fire-pot A having in its upper portion or neck two series of apertures *b c*, in combination with the

partially-rotatable damper E F adapted by a slight movement to close one series and open the other series of apertures, and with a water-chamber arranged with relation to the currents through said apertures, substantially as set forth.

2. In a heating apparatus, the fire-pot and its dome D, the two series of apertures *b c* and their dampers E F alternately operative and affording escape from the fire-pot at two different heights in combination with the curved water-chamber J, the flame-space N surrounding it and the smoke-drum above it and communicating with said space, substantially as set forth.

3. In a heating apparatus, the fire-pot with lateral apertures in two distinct series, the partially-rotating damper E F, made in two parts and serving to deflect the caloric current as desired, and with means for operating such dampers reversely, in combination with a water-chamber external to said aperture and located in the flame-space in the direct path of the current through the lowermost apertures but below the path of the other current, substantially as set forth.

4. In a heating apparatus, the fire-pot having lateral apertures in two series, at varying heights, the dampers E F controlling them, and the flame-space N external thereto, in combination with the water-chamber J, partitioned as described, located within said space and provided with flow and return pipes to insure circulation, and the external jacket S inclosing air to be heated and furnished with distribution-pipes U, substantially as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 21st day of October, A. D. 1895.

NEWLAND E. FROST.

Witnesses:

C. C. DOMETT,
E. C. BOURNE.