

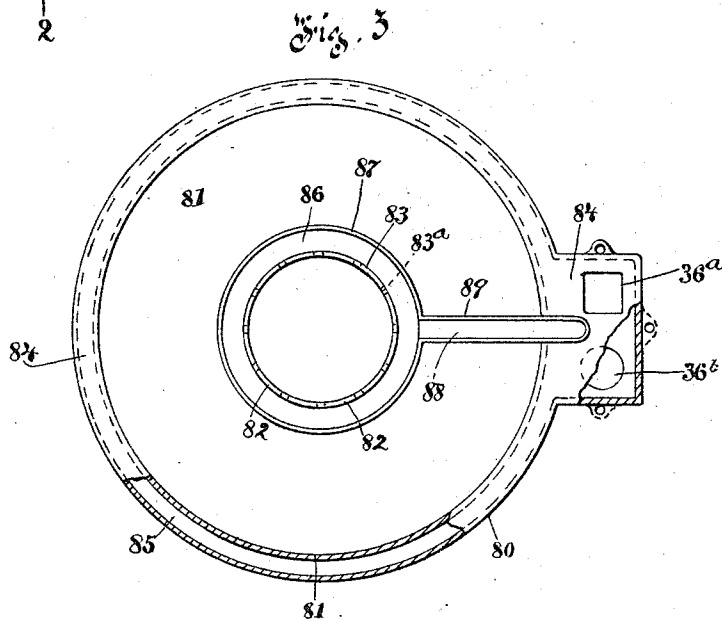
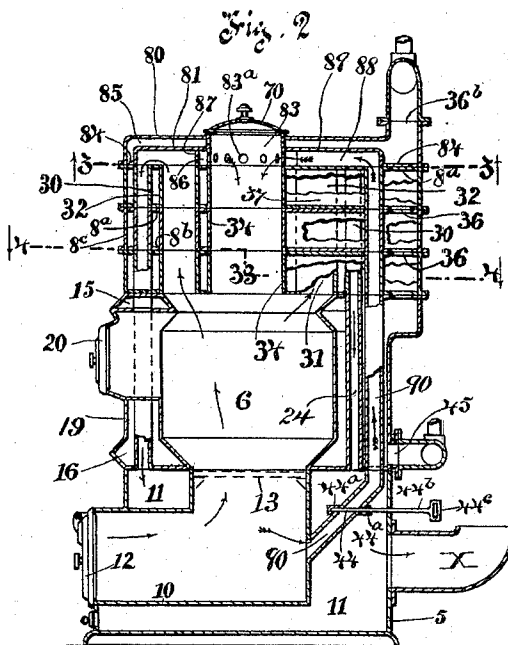
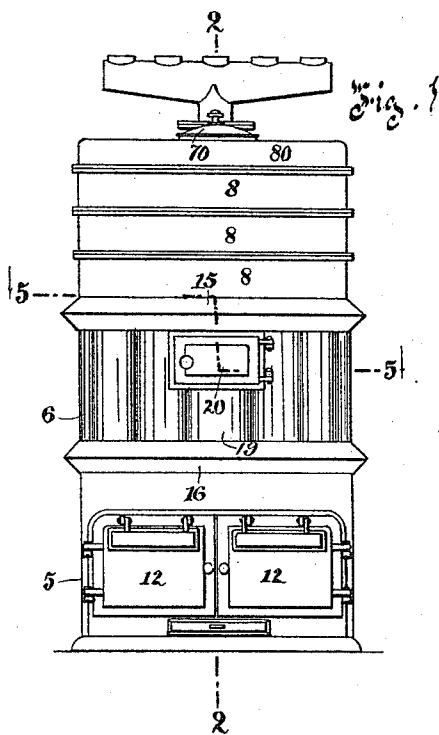
(No Model.)

2 Sheets—Sheet 1.

G. A. WATSON.
HEATER.

No. 573,170.

Patented Dec. 15, 1896.



Witnesses
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(No Model.)

2 Sheets—Sheet 2.

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Fig. 4

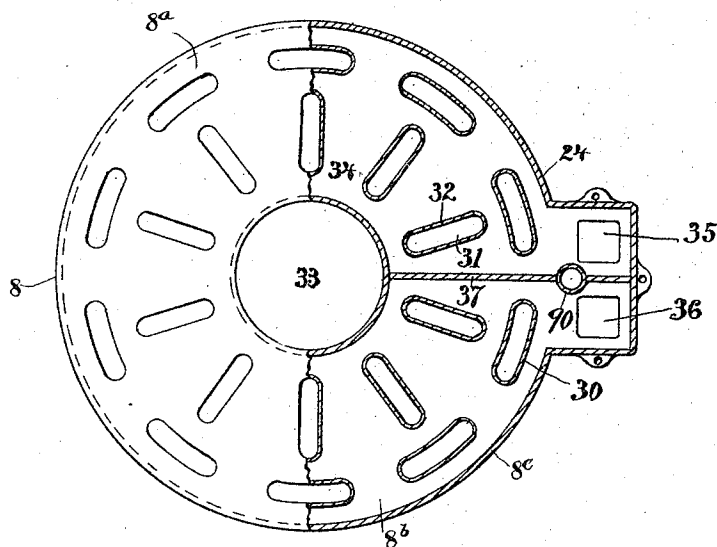
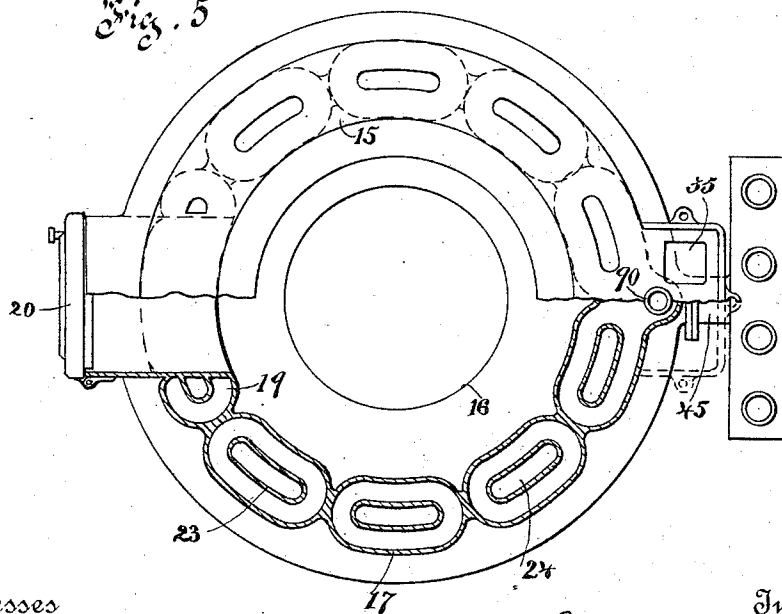


Fig. 5



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UNITED STATES PATENT OFFICE.

GEORGE ALFRED WATSON, OF TORONTO, CANADA, ASSIGNOR TO JOHN BARCLAY, OF MONTREAL, CANADA.

HEATER.

SPECIFICATION forming part of Letters Patent No. 573,170, dated December 15, 1896.

Application filed April 6, 1896. Serial No. 586,459. (No model.)

To all whom it may concern:

Be it known that I, GEORGE ALFRED WATSON, manufacturer, of the city of Toronto, in the Province of Ontario, but temporarily residing in the city of Montreal, Province of Quebec, Canada, have invented certain new and useful Improvements in Heaters; and I do hereby declare that the following is a full, clear, and exact description of the same.

The object of my invention is, first, to increase the heat-distributing area of the heater; secondly, to secure a better distribution of the water through the sections, and thus insuring a more perfect heating thereof; thirdly, to prevent the undesirable escape of gases and dust from the heater either while fuel is being supplied or while the grate is being shaken, and, lastly, to improve the construction of hot-water heaters generally.

My invention may be said, briefly, to consist in constructing the heater to comprise one or more sections embodying a series of annular water-spaces, and these water-spaces preferably connecting a pair of water-chambers and an independent heating-space inclosed by said independent water-spaces and extending through said chambers, also to connect the source of draft with the dust-pan and coal supply, besides the combination, arrangement, and construction of parts, (and the equivalents thereof,) as hereinafter described, illustrated in the drawings, and pointed out in the claims. For full comprehension, however, of my invention reference must be had to the accompanying drawings, forming a part of this specification, in which like symbols indicate the same parts, and wherein—

Figure 1 is a front elevation of a heater, partly in section; Fig. 2, a transverse vertical sectional view taken on line 2 2, Fig. 1. Figs. 3, 4, and 5 are transverse horizontal sectional views taken on the lines 3 3 4 4, Fig. 2, and 5 5, Fig. 1, respectively.

The heater is preferably made up of an ash-pit section 5, a fire-pot section 6, a top section 8, and any desired number of sections 8, intermediate of the top section and fire-pot section. The ash-pit section 5 is formed with an ash-pan section 10, smaller than and within said section 5 and located near the top thereof, in order that said section will form a jacket

or chamber 11, adapted to inclose same on all sides excepting the front and top, at which points the ash-pan connects, respectively, with the front of the casing, through which access can be had to the pan by means of doors 12 and the fire-pot. The grate 13 (indicated by dotted lines) may be of any desirable construction and is carried at the upper end of this ash-pit section 5. On the top of this section is set the fire-pot section 6, which is preferably constructed as follows:

Two circular water-chambers 15 and 16 are located one above the other and have openings (preferably oval and located concentric of the fire-pot) in their adjacent sides and opposite to one another, each pair of openings being connected by one of a series of vertical tubes 17, thus forming a series of independent passages for the water from one chamber to the other and connecting the interiors of such chambers at short intervals all around same, excepting at the front, where the connection is made by a U-shaped portion 19 in order to provide a space to accommodate the fire-door 20, the tubes that form the upright arms of this connecting portion 19 being of less capacity than the connecting-tubes 17. These parts, *i. e.*, the chambers 15 and 16, the tubes 17, and U-shaped portion 19, are preferably made integral, and the chambers are preferably formed with angular sides, as shown. The upper side of the upper chamber 15 and the lower side of the lower chamber 16 are provided with openings corresponding in shape to and of less diameter than, but concentric with, the openings with which the tubes 17 are connected, and these openings in the sides of chambers 15 and 16 are connected by tubes 23, thus forming a series of continuous gas-passages 24 through the chambers 15 and 16 and the connecting water-passages formed by the tubes 17. The intermediate sections 8 are preferably constructed with top and bottom plates 8^a and 8^b and inclosing side 8^c, the plates 8^a 8^b being each provided with a circle of perforations connected by tubes 30, corresponding with tubes 23, and thus forming a continuation to the passages 24. A second circle of passages 31, inside of the circle of passages 24, but radial of

the fire-pot, are formed, similarly to said passages 24, by perforations in the top and bottom plates of the sections and connecting said plates by tubes 32, and a main central passage 33 is formed by perforating the center of the top and bottom plates of each section and connecting said perforations by a tube 34, which, as will hereinafter be set forth, forms the magazine.

The water-back is formed of corresponding rearward extensions from the top section 80 and each of the intermediate sections 8, and a communication between each and all of these sections is effected by two openings 35 and 36 in each of the top and bottom plates 8^a and 8^b, respectively, of the intermediate sections 8 and an opening 36^a (corresponding with the openings 36) in the bottom plate 84 (to be hereinafter further described) of the top section 80, while an opening 36^b serves as the flow-outlet. A vertical diaphragm 37 extends between the openings 35 and 36 from plate 8^b to plate 8^a and from the rear side of the water-back portion of each section forward to the central tube 34. The openings 35 and 36 are continued down through the upper end of chamber 15, and the return-inlet 45 is provided at the rear of the lower chamber 16.

The top section 80 is formed of an approximately flat plate having a central opening therethrough provided with a cover 70 and corresponding in size to the interior of tube 34. This plate has all of its periphery (excepting the rear extension, that forms the water-back) curved downwardly to rest upon the top side of the uppermost intermediate section 8 and forms a space that is divided horizontally about midway of its height by a diaphragm 81, having its periphery turned and extended downwardly to a point in line with the edge of the top plate. This diaphragm has a central opening corresponding in diameter to the central opening of the top plate, and a tubular section 83 extends from the edge of said last-mentioned opening, to which it is connected, down past the opening in diaphragm 81, with the edges of which opening it is also connected, to a point in line with the turned-down edges of the top plate and the diaphragm, such edges being connected by a horizontal plate 84, thus forming a water-space 85, extending continuously around the top section.

An air-inlet to the central tube 34 is provided, preferably, by securing to the under side of diaphragm 81 and adjacent to tubular section 83 a ring or circular diaphragm 87, extending from said diaphragm 81 downward to a point in line with the edge thereof, in order that when said top section is set in place the lower edge of said circular diaphragm 87 will rest upon the top of the section next below it and thus form space 86 continuously around said tubular section 83, and with which tubular section said space communicates through a series of openings 83^a. A series of pipe-

sections 90 extend in line with one another through each intermediate section and preferably near the rear edge of the heater downward to the fire-pot, and the ash-pit sections, which have corresponding pipe-sections, to the ash-pan, with which it is connected, while the upper ends of these pipe-sections communicate with a horizontal passage 88, preferably formed by an inverted-U-shaped trough 89, which in turn communicates with the circular space 86.

I consider it preferable to provide the passage formed by pipe-sections 90 with means for regulating the draft therethrough, and to this end I locate a sliding damper 44 at any desirable and effective point, but preferably adjacent to the ash-pan and in the pipe-section connected immediately thereto, such pipe-section being formed with a horizontal extension 44^a, in which the damper is guided. This damper is preferably formed of a flat portion located in the guiding-section of the pipe, and a rod 44^b, connected thereto, extends rearwardly through the back of the heater and is terminated in a handle-section 44^c.

As the grate-section proper forms no part of my present invention, I have not considered it necessary to describe same, and it is therefore only indicated in dotted lines in Fig. 2.

A heater constructed and assembled according to the foregoing will present a greater heating area than has been obtained heretofore, and the circuit of the heated gases therethrough, except while fuel is being supplied or the fire shaken, will be as follows: The heated gases rise from the fire through the series of passages 31 into the top section 80 and are drawn thence down passages 24 and through jacket 11 to the chimney connection X. When it is desired to remove the cover 70 to fill the magazine formed by tube 34 with fuel, or for other reasons, the damper 44, if closed, is opened and the damper in the ash-pit door closed, when the draft will be from the ash-pan, through the conductor or passage formed by the pipe 90, air-space 86, openings 83^a, and magazine 34 into the fire-pot, whence it proceeds by the main flues or passages 31 to top section 80, through passages 24, to jacket 11, and the chimney connection X.

The water-circuit will be from return-inlet 45, into and around chamber 16, up the annular spaces between tubes 17 and 23 and U-shaped portion 19, to and around chamber 15, thence through the opening 35 in the upper end of such chamber 15, through the various intermediate sections 8 and the top section 80, to the flow-outlet 36^b.

It is obvious that all or any one of the sections can be constructed upon the same novel principle as the fire-pot section or the construction thereof to provide annular water-spaces and water-chambers connected by independently and interiorly heated small bodies of water varied to a considerable extent and many other changes made without departing from the spirit of my invention.

What I claim is as follows:

1. An integral annular section for hot-water heaters formed of a series of separate annular water-chambers forming the wall of the section and each inclosing a separate heating-space.

2. A section for hot-water heaters, formed of two water-chambers and a series of independent separate annular water-passages connecting said chambers and forming the wall of the section, and each passage inclosing a separate heating-space, with flow connections from one, and a return connection to the other, of said chambers.

3. A section, for hot-water heaters, formed of two water-chambers and a series of independent separate annular water-passages connecting said chambers, each passage inclosing a separate heating-space, and heat-passages extending from said heating-spaces through said water-chambers with flow connections from one, and a return connection to the other, of said chambers.

4. In a hot-water heater, the combination of, an ash-pit section formed with a jacket having an outlet to the open air, a grate, an annular fire-pot section arranged above said ash-pit section and formed of a series of separate vertical annular water-chambers arranged side by side and each inclosing a separate heating-space connected at its lower end with said jacket, one or more water-sections located above said fire-pot and a top water-section located above said water-sections, said water-sections having a series of vertical passages therethrough connecting the spaces inclosed by said annular water-chambers with a space formed by said top section, and a series of passages connecting the space formed by said top section with the fire-pot, a flow and return connection with the body of water contained in said heater, for the purpose set forth.

5. In a hot-water heater, the combination of, an ash-pit section formed with a jacket having an outlet to the open air, a grate, an annular fire-pot section arranged above said ash-pit section and formed of a series of separate vertical annular water-chambers arranged side by side and each inclosing a separate heating-space connected at its lower end with said jacket, one or more water-sections located above said fire-pot and a top water-section located above said water-sections, said water-sections having a series of vertical passages therethrough connecting the spaces inclosed by said annular water-chambers with a space formed by said top section, and a series of passages connecting the space formed by said top section with the fire-pot, a flow and return connection with the body of water contained in said heater, and an independent heated air supply from the ash-pan to the fire-pot, for the purpose set forth.

6. In a heater, the combination with a main flue or flues connecting the fire-chamber with the chimney connection, of a secondary con-

ductor or passage independent of the grate-section and said main flue or flues and connecting said under side of the grate with the fire-chamber, for the purpose set forth.

7. In a heater, the combination with a coal-magazine and main flue or flues connecting the fire-chamber with the chimney connection, of a secondary flue or flues independent of the grate-section and of the main flue or flues and connecting said under side of the grate with said coal-magazine, for the purpose set forth.

8. In a hot-water heater, the combination of, an ash-pit section formed with an ash-pan section smaller than and set within said ash-pit section and located near the top thereof to form a jacket or chamber surrounding said ash-pan on all sides excepting the front and top thereof said front portion communicating with an opening in the front of the casing, and said jacket or chamber communicating with the chimney; a grate located at the top of said ash-pan section; a fire-pot section arranged above and resting upon said ash-pit section and formed of two circular water-chambers located one above the other and connected by a series of tubes and a U-shaped portion to form independent water-passages from one to the other of said circular water-chambers; a series of tubes each of which extends from the lower side of said lower circular chamber to the upper side of said upper circular chamber and located within and being of less diameter than said first-mentioned tubes; one or more water-sections located above said fire-pot section and provided with a series of vertical passages corresponding in size with and connected to the passages formed by the smaller tubes through said fire-pot section, a second circle of vertical passages and a tube leading from the fire-pot upward through all of the said water-sections; a water-back formed by a rearward extension from each of said water-sections and a vertical dividing-diaphragm extending from said central tube rearward to the rear of said extension, communicating openings between said sections and located on either side of said diaphragm; a top section located above said water-sections and formed to present a water-chamber, a chamber communicating with all of the vertical passages through said water-sections, and an air-chamber encircling the upper perforated end of a central tube extending vertically therethrough and corresponding to the central tube of said water-sections, said tube being provided with a cover, a rearward extension corresponding to said water-back and having a communication with same; a pipe connected with and extending from said circular air-space to and connected with the ash-pan; a damper for opening or closing said pipe; and flow and return connection to connections from said top section and the lower circular chamber of the fire-pot section respectively, for the purpose set forth.

9. In a hot-water heater, the combination of, an ash-pit section; a grate located at the top of said ash-pit section; a fire-pot section arranged above and resting upon said ash-pit section and formed of two circular water-chambers located one above the other and connected by a series of tubes to form independent water-passages from one to the other of said circular water-chambers; a series of tubes each of which extends from the lower side of said lower circular chamber to the upper side of said upper circular chamber and located within and being of less diameter than said first-mentioned tubes; one or more water-sections located above said fire-pot section and provided with a series of vertical passages corresponding in size with and connected to the passages formed by the smaller tubes through said fire-pot section, a second circle of vertical passages and a tube leading from the fire-pot upward through all of the said water-sections; a top section located above said water-sections and formed to present a water-chamber a chamber communicating with all of the vertical passages through said water-sections, and an air-chamber encircling the upper perforated end of a central tube extending vertically therethrough and corresponding to the central tube of said water-sections; a pipe connected with and extending from said circular air-space to and

connected with the ash-pan; a damper for opening or closing said pipe; flow connections from said top section and return connections to the lower circular chamber of the fire-pot section, for the purpose set forth. 35

10. In a hot-water heater, the combination of, an ash-pit section formed with a jacket having an outlet to the open air, a grate, a fire-pot section arranged above said ash-pit section and having heat-passages therethrough, one or more water-sections located above said fire-pot and having a series of heat-passages therethrough connected with the fire-pot and additional heat-passages connected with the heat-passages of the fire-pot sections, and a top water-section located above said water-sections inclosing a space and communicating with all of the heat-passages of said water-sections, a flow and return connection with the body of water contained in said heater, an open-ended vertical fuel-magazine extending from the fire-chamber to the top of the heater and provided with a cover and a heated-air supply, from the ash-pan to the upper end of said magazine, for the purpose set forth. 40 45 50 55

Montreal, February 28, 1896.

GEO. ALFRED WATSON.

In presence of—

WILL. P. MCFEAT,
FRED. J. SEARS.