

UNITED STATES PATENT OFFICE.

THOMAS JOSEPH BEST, OF MONTREAL, CANADA.

HOT-WATER FURNACE.

SPECIFICATION forming part of Letters Patent No. 612,153, dated October 11, 1898.

Application filed March 12, 1898. Serial No. 673,675. (No model.)

To all whom it may concern:

Be it known that I, THOMAS JOSEPH BEST, of the city of Montreal, in the district of Montreal and Province of Quebec, Canada, have invented certain new and useful Improvements in Hot-Water Furnaces; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention has for its object to provide a furnace that will give better results than have been obtainable heretofore from a furnace of like capacity and one that will be simpler and less costly to construct.

To these ends the invention may be said briefly to consist of a hot-water furnace composed of an ash-pit section, a fire-chamber section, a top section or dome, and an intermediate section, the intermediate section having a fire-flue extending at an angle from the rear to the front thereof and opening at the rear downwardly into the fire-chamber and at the front upwardly into the dome, the dome preferably having a depression in the top thereof and the said sections being preferably connected together by an improved connection.

For full comprehension, however, of the foregoing 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 furnace constructed according to my invention; Fig. 2, a transverse vertical sectional view of the water-sections thereof, taken on line 2 2, Fig. 1; Fig. 3, a plan view of the fire-pot section; Fig. 4, a plan view of the intermediate section, and Fig. 5 a plan view of the under side of the top section or dome.

The fire-pot section (shown in detail plan view in Fig. 3) consists of an inner casing 40 and an outer casing 41, provided with a rear and two side lateral extensions 42 and 43 43, respectively, and connected to said inner casing by means of upper and lower diaphragms 44 and 45, respectively, the lower diaphragm being intact, while the upper diaphragm has openings 46 to register with the passages formed by said lateral extensions 42 and 43 43, while the return-pipe 48 of the heating system takes into an opening in the rear of the outer casing near the bottom thereof and

communicates with the jacket formed by said outer and inner casings.

The intermediate section—*i. e.*, the section next above and resting upon said fire-pot section—consists also of inner and outer casings 50 and 51, respectively, connected together at their top and bottom edges by the respective diaphragms 52 and 53, and the outer casing having a rear and two side lateral extensions 54 and 55 55, respectively, corresponding and registering with the extensions 42 and 43 43 of the fire-pot section. The lower diaphragm 53 extends completely across the lower end of said intermediate section except for a transverse opening 56, extending completely across from side to side of the inner casing 50 at the rear side but inside thereof, and openings 57, adapted to register with the passages formed by the side extensions 55 55, the remainder of the diaphragm being intact and blinding the passage formed by the rear extension 54. The upper diaphragm 52 also extends completely across the end of this intermediate section, except for an opening 58, corresponding to the opening 56, but at the front and also inside of said inner casing, and an opening 59, which registers with the said passage formed by the rear extension 54, the remainder of this diaphragm being intact and blinding the passages formed by the side extensions 55. Intermediate of these upper and lower diaphragms 52 and 53 53 are located a pair of diagonal diaphragms 60 and 61, connecting the edges of said upper forward opening 58 to the edges of the lower rear opening 56, and the intervening portions of the inner casing between the diagonal diaphragm 60 and the upper diaphragm 52, and the diagonal diaphragm 61 and the lower diaphragm 53 are cut away, thus extending the jacket above and beneath the passage formed by said diagonal diaphragms. The top section or dome consists also of inner and outer casings 70 and 71, respectively, the outer casing having at its lower end a rear and two side lateral extensions 72 and 73 73, respectively corresponding to and registering with the upper ends of the passages formed by the extensions 54 and 55 55 of the intermediate section, the roof of the inner casing being indented, as at 74, to serve the double purpose of increasing the area of the jacket and providing a baffle

adapted to extend transversely from side to side of said inner casing, thus providing an increased water-space adjacent to the flow connection of the heater and a baffle or bridge adapted to in a measure retard the passage of the heated gases rising to the chimney connection. This increased water-space at the flow connection has the effect of increasing the pressure of the flowing water besides the degree of heat at that point, thereby securing the greatest possible efficiency of the heater, while a diaphragm 75 connects the lower edges of the inner and outer jackets, except for an opening 76, corresponding in area to and registering with the upper end of the passage 59, the remainder of this diaphragm being intact and blinding the passages 57 57.

The fire-pot is provided with a fire-door 80 and the intermediate and top sections with doors 81 and 82, respectively, the latter doors being to allow of access to the combustion-passages for cleansing purposes, while a communication is effected with the chimney by a tubular flue 83, and the flow-pipe is connected, preferably, as shown at 84, to the top of the dome or top section.

My improved manner of connecting the sections together consists of independent chambers 90, formed, preferably, by vertical tubular extensions 91, cast in one with the intermediate section and having their ends closed and provided with screw-threaded perforations 92, while the top section or dome and the fire-pot section have cast in one therewith a series of perforated lugs 95, through which screw-bolts take into said screw-threaded perforations 92, thus effectively securing the sections together and at the same time providing bolt-spaces adapted to allow of expansion and prevent any leakage of joints.

The circuits through my improved furnace are, as indicated, the products of combustion rising from the fire passing up through the diagonal passage A to the dome and thence to the chimney, while the water circulation is from the jacket of the fire-pot through passages 57 to the jacket of the intermediate section and thence through passage 59 to the jackets of the dome or top section and out through the flow connection 84 and, after traversing the coils and piping (not shown) of the heating system, returns again to the jacket of the fire-pot section through return connection 48.

55 An ash-pit section of any approved construction may be used.

What I claim is as follows:

1. In a hot-water furnace, a water-heating section consisting of a vertical inclosing casing closed at its top end by a diaphragm having a transverse opening near the front thereof and at its bottom end by a diaphragm having a transverse opening near the rear thereof, a tubular section extending diagonally through said casing and connecting the edges of the said respective openings and a flow and a re-

turn connection to the space intermediate of said diagonal tubular section and the interior of said casing, for the purpose set forth.

2. A hot-water furnace composed of an ash-pit section a fire-chamber section inclosed by a water-jacket having a return connection; a dome inclosed by a water-jacket having a flow connection; and an intermediate section; said intermediate section consisting of a vertical inclosing casing closed at its top end by a diaphragm having a transverse opening near the front thereof and at its bottom end by a diaphragm having a transverse opening near the rear thereof, a tubular section extending diagonally through said casing and connecting the edges of the said respective openings and pair of passages connecting the space intermediate of said diagonal tubular section and the interior of said casing with said respective inclosing water-jackets, for the purpose set forth.

3. A hot-water furnace composed of an ash-pit section; a fire-chamber section; a dome having inner and outer casings 70 and 71 constituting a water-space and a heat-passage, and an intermediate section having a fire-flue extending at an angle from rear to front and opening at the rear downward into the fire-chamber and at the front upwardly into the dome, and the dome having a depression 74 in the top of the inner casing to provide an increased water-space adjacent to the flow connection and a baffle or bridge in the heat-passage, for the purpose set forth.

4. In a hot-water furnace, a dome or top section having inner and outer casings 70 and 71 constituting a water-space and a heat-passage, and having depression 74 in the top of the inner casing to provide an increased water-space adjacent to the flow connection and a baffle or bridge in the heat-passage, for the purpose set forth.

5. A furnace comprising an ash-pit section; a fire-chamber section, a top section or dome and an intermediate section; the fire-chamber section being inclosed by a water-jacket having a rear extension and a pair of side extensions forming vertical passages, and a return-pipe connection at its lower end; the intermediate section comprising a diagonal passage extending from the lower rear end thereof to the forward top end thereof, a water-jacket inclosing said passage and having a rear and a pair of side extensions forming vertical passages corresponding to and registering with the above-mentioned vertical passages, the lower end of the rear passage of this intermediate section being blinded; the top section or dome located above and resting upon said intermediate section and comprising a water-jacket having a rear and a pair of side lateral extensions forming vertical passages corresponding to and registering with the above-mentioned vertical passages, the lower ends of the side passages of this top section or dome being blinded, a flow-pipe

connection at the upper end of this jacket, and a chimney connection with the top of the interior of said top section or dome, substantially as set forth.

5 6. A furnace comprising an ash-pit section; a fire-chamber section, a top section or dome and an intermediate section, the fire-chamber section being inclosed by a water-jacket having a rear extension and a pair of side extensions forming vertical passages, and a return-pipe connection at its lower end; an intermediate section located above and resting upon said fire-pot section and comprising a diagonal passage extending from the lower rear end thereof to the forward top end thereof, a water-jacket inclosing said passage and having a rear and a pair of side extensions forming vertical passages corresponding to and registering with the above-mentioned vertical passages, the lower end of the rear passage of this intermediate section being blinded; the top section or dome comprising a water-jacket having a rear and a pair of side lateral extensions forming vertical passages corresponding to and registering with the above-mentioned vertical passages, the lower ends of the side passages of this top section or dome being blinded, a flow-pipe connection at the upper end of this jacket, a downward extension from the interior of the top of said dome and extending transversely thereof, and a chimney connection with the top of the interior of said top section or dome, substantially as set forth.

35 7. A furnace comprising a series of independent sections supported one upon the other, the intermediate section having a series of lateral chambers extending the full height of said section and being formed at their upper and lower ends with screw-threaded perforations, and the sections located next above and below said intermediate section being formed with laterally-projecting perforated lugs adapted to overlap said chambers and be connected thereto by screw-bolts taking

ing therethrough and into said screw-threaded perforation, for the purpose set forth.

8. A furnace comprising an ash-pit section, a fire-chamber section, a top section or dome and an intermediate section, the fire-chamber section being inclosed by a water-jacket having a rear extension and a pair of side extensions forming vertical passages, and a return-pipe connection at its lower end; the intermediate section comprising a diagonal passage extending from the lower rear end thereof, to the forward top end thereof, and a water-jacket inclosing said passage and having a rear and a pair of side extensions forming vertical passages corresponding to and registering with the above-mentioned vertical passages, and the lower end of the rear passage of this intermediate section being blinded; the top section or dome comprising a water-jacket having a rear and a pair of side lateral extensions forming vertical passages corresponding to and registering with the above-mentioned vertical passages, the lower ends of the side passages of this top section or dome being blinded, a flow-pipe connection at the upper end of this jacket, and a chimney connection with the top of the interior of said top section or dome, the intermediate section also having a series of lateral chambers extending the full height of said section and being formed at their upper and lower ends with screw-threaded perforations, and the top and fire-pot sections being formed with laterally-projecting perforated lugs adapted to overlap said chambers and be connected thereto by screw-bolts taking therethrough and into said screw-threaded perforations substantially as set forth.

In testimony whereof I have affixed my signature in presence of two witnesses.

THOMAS JOSEPH BEST.

Witnesses:

WILL P. McFEAT,
FRED. J. SEARS.