D. J. ARCHER.

HOT WATER FURNACE.

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946,310.

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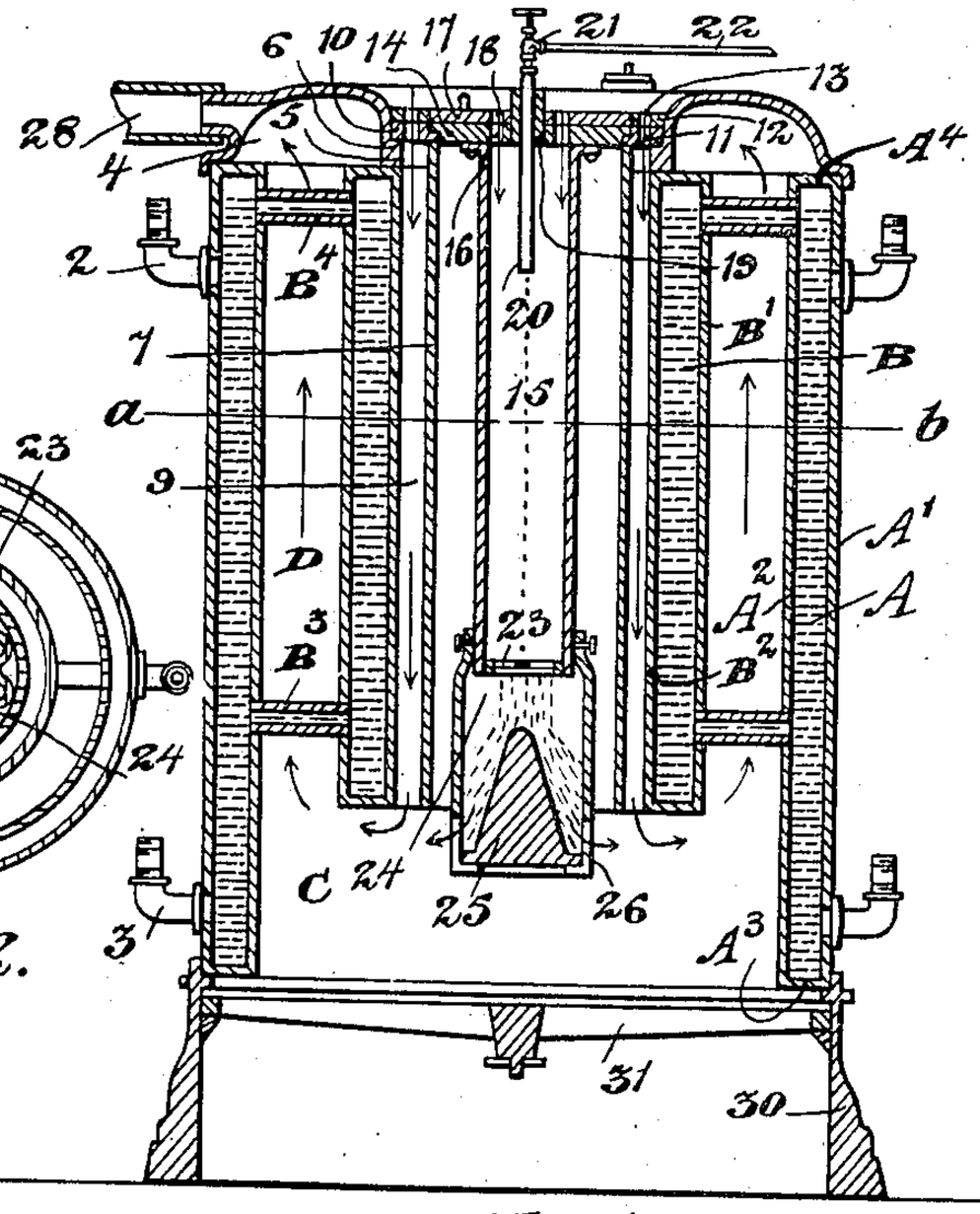

Fig. 1.

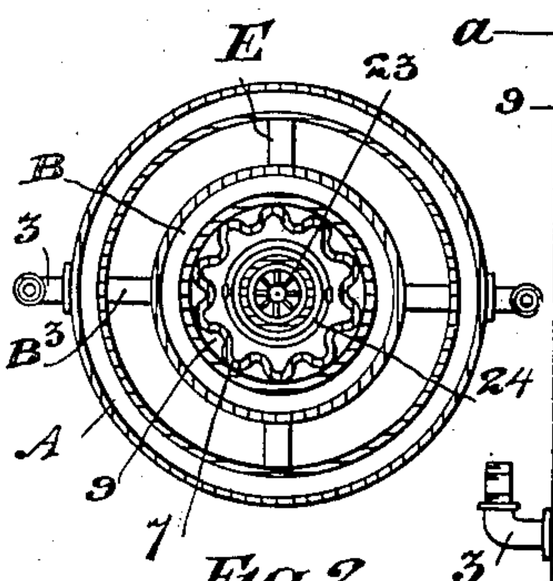

Fig. 2.

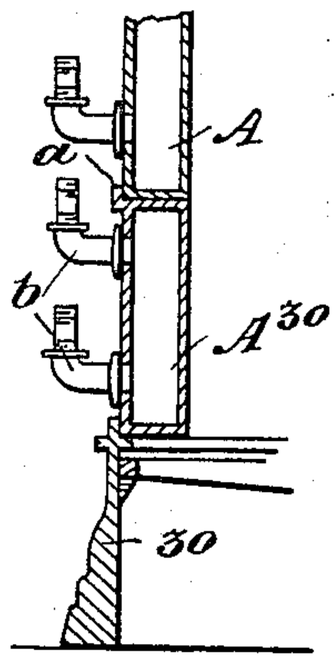

Fig. 6.

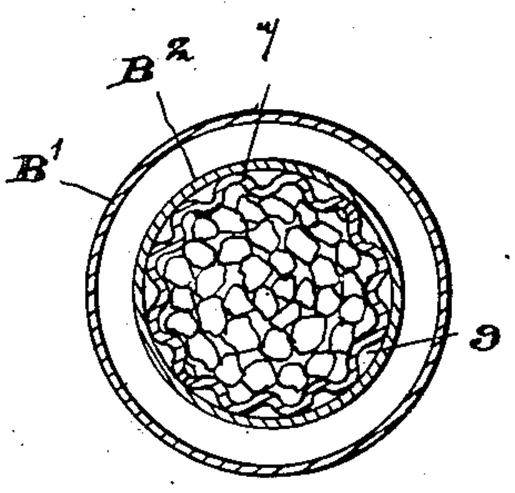

Fig. 5.

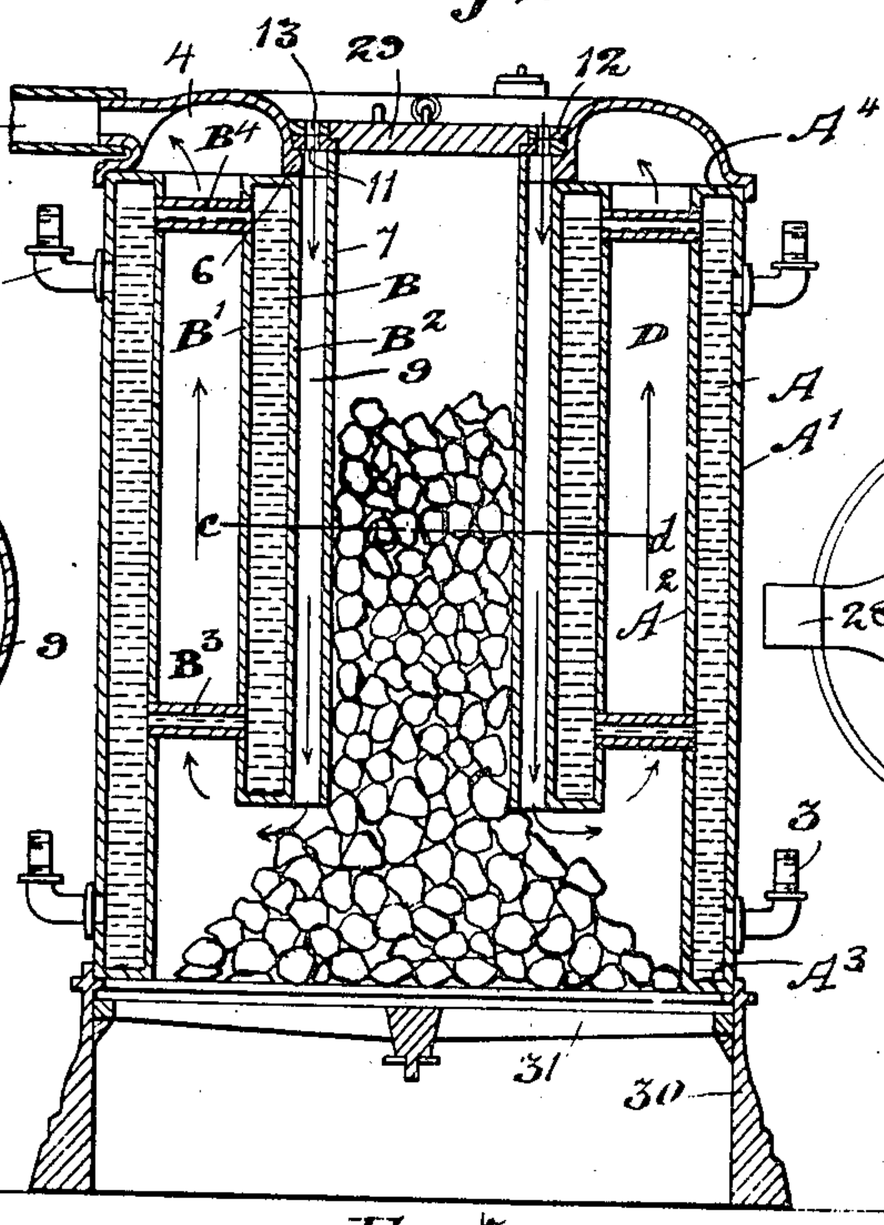

Fig. 3.

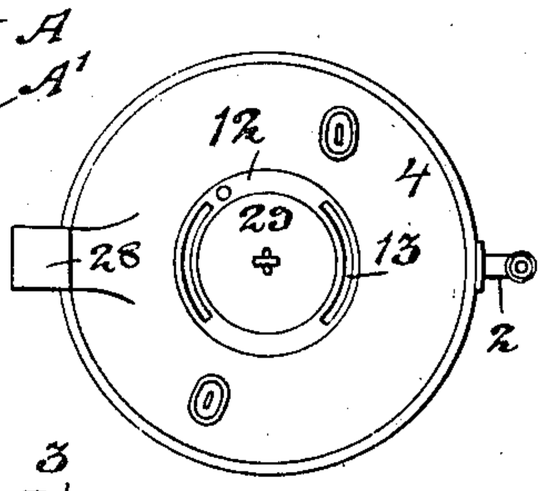

Fig. 4

Witnesses.

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HOT-WATER FURNACE.

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To all whom it may concern:

Be it known that I, DAVID JOHN ARCHER, a subject of the King of Great Britain, residing in the city of Toronto, in the county of York, Province of Ontario, Canada, manufacturer, have invented certain new and useful Improvements in Hot-Water Furnaces, of which the following is a specification.

My invention relates to improvements in hot-water furnaces, and the object of my invention is to construct a center-down draft hot-water furnace with which different kinds of fuel can be used, and to so construct my hot-water furnace that the necessary removal or replacing of parts thereof may be readily accomplished with very little trouble in order to adapt the furnace so that the desired fuel may be used therein.

Another object of my invention is to construct a hot-water furnace so that it will have an effectual and positive center-down-draft, thereby enabling the fuel used to be positively consumed.

The construction of my preferred form of invention will be hereinafter particularly described, and the parts I claim as new will be pointed out in the claims forming part of this application.

Figure 1 is a vertical central section through my preferred form of hot-water furnace showing the same adapted for the burning of fuel-oil. Fig. 2 is a horizontal cross-section on the line *a*—*b*, Fig. 1. Fig. 3 is a vertical central section through my preferred form of hot-water furnace showing the same adapted to burn coal and similar combustible material. Fig. 4 is a plan-view of the form of furnace shown in Fig. 3; Fig. 5 is a horizontal cross-section on the line *c*—*d*, Fig. 3, and Fig. 6 is a vertical section through part of the outer water chamber showing an alternative form of construction therefor.

In the drawings, like characters of reference indicate corresponding parts in each figure.

I am not aware that there are hot-water furnaces on the market in which either fuel-oil or coal can be burned, and it is the chief object of this present invention to provide a furnace with a suitable fuel-oil burner supported therewithin in such a manner that if it is desired to burn coal in the furnace, the fuel-oil burner may be readily removed therefrom.

The water-boiler or water-chamber A is preferably circular, and consists of the outer wall A^1 and the inner wall A^2, which are connected together at the top and bottom as shown at A^3 and A^4. Supported within the said water-chamber or water-boiler is an inner water-chamber or water-boiler B which is composed of the outer and inner walls B^1 and B^2, which walls are connected together at the top and bottom by the same construction used to connect the walls A^1 and B^1 together.

B^3 and B^4 are water-pipes connecting the water-chambers or water-boilers A and B in order to permit of the necessary circulation of the water therebetween.

It will be noticed that the top of the water-chamber or boiler B is substantially flush with the top of the water-chamber or boiler A, and that the water-chamber or water-boiler B is shorter than the water-chamber or water-boiler A, thus forming the fire-box C. It will be noticed that the water-chamber A entirely surrounds the fire-box.

2 are any suitable feed-pipes, and 3 any suitable return pipes.

The dome or cover 4 is removably supported upon the top of the water-chamber or boiler A. The central portion of this dome or cover is depressed and is provided with a central opening 5. This central opening 5 is provided with a flange 6 which preferably rests upon the top of the water chamber or boiler B. It will be noticed that the inner water-chamber or boiler B is tubular. Within this tubular water-chamber or boiler I provide means which will insure a positive down-draft into the fire-box and my preferred means for this purpose consists of a corrugated pipe 7, the corrugations of which will be seen upon referring particularly to Figs. 2 and 5. This corrugated pipe is suitably secured in place. By means of the corrugated pipe 7 it will be understood that I provide a plurality of passageways 9 down through which the draft will have an unobstructed passage.

10 is an annular plate resting on the top of the corrugated pipe 7 and upon the flanged edge 6. This annular plate is provided with draft openings 11 which are opened and closed by the annular damper 12 which is of course provided with openings or slots 13.

14 is a lid provided at its edge with the ordinary seating-flange which fits into the cor-

respondingly-shaped seating flange formed in the inner edge of the annular plate 10: this construction is well known. Depending from the lid 14 is a conduit 15 into which opens the draft-slot 16 formed in the lid 14.

17 is a damper plate which operates upon the lid 14, and this damper-plate is provided with openings or slots 18 which are made to register, when desired, with the draft-slot 16. By means of the construction just described the down-draft through the conduit 15 is regulated.

19 is a sleeve held in the lid 14, and held in the sleeve is the drip-pipe 20, for the fuel-oil.

21 is any suitable valve controlling the passage of the fuel-oil from the feed-pipe 22 into the drip pipe 20. It will be noticed that the drip-pipe 20 introduces the oil into the conduit 15. As the oil drops through the conduit, it strikes upon the grid 23 and is more or less comminuted, thereby enabling it to be mixed with a down-current of air, which air acts as a vehicle and carries it into the casing 24 which is suitably secured over the end of the conduit 15. Supported within this casing and extending up thereinto, is a cone 25 with which the comminuted oil is brought into contact so as to positively insure its conversion into gas before it is consumed.

As will be understood, the mixed oil and air are ignited in the usual way, and when the burner used becomes heated, the comminuted oil is positively converted into gas when it reaches the said cone. 26 are openings in the bottom of the casing 24 through which the burning gas escapes. I of course may use any suitable fuel-oil burner with my furnace. The fuel-oil burner illustrated and described may be used with very excellent results.

Upon referring to Figs. 1 and 3 it will be noticed that the water-chambers or water-boilers A and B are spaced apart thus forming a passageway D through which the waste products of combustion escape from the fire-box into the dome 4. This construction enables me to substantially entirely envelop the inner water-chamber or boiler B with heat. 28 is any suitable pipe or conduit to carry off the waste products of combustion from the dome 4.

E are any suitable supporting posts extending between the water-chambers A and B.

Although I show the corrugated pipe 7 associated with the fuel-oil burner, Fig. 1, still I do not confine myself to necessarily using the same, because I have found from actual practice that the down-draft through the fuel-oil burner will enable me to generate the desired heat.

When I wish to burn coal or similar combustible material in my furnace, I disconnect the drip-pipe 20 from the feed-pipe 22, and remove the lid 14 and damper-plate 17. As the fuel-oil burner depends from the lid 14, it will be understood that the same is withdrawn from the furnace. So soon as I have removed the fuel-oil burner, I replace the lid 14 with an imperforate lid 29.

30 is any suitable base provided with the usual door or gate (not shown), upon which rests the water-chamber A. Suitably supported by this base is any suitable grate 31.

Upon referring to Figs. 3 and 5 it will be seen that I show my furnace adapted so that coal or similar combustible material may be used therein. As before mentioned, the corrugated pipe 7 provides a plurality of passageways 9 down through which the air freely passes. As there is more or less coal-dust mixed with coal, the same fills the interstices between the pieces of coal, and thus effectually prevents any positive and continuous draft down through the body of coal. Therefore it will be understood by one skilled in this art that the presence of the corrugated pipe 7 within the conduit or pipe E provides a positive and continuous supply of fresh air down into the fire-box, thus enabling proper combustion of the fuel to take place. As before described by means of the annular plate 10 and the damper 12 connected therewith, I am enabled to get positive regulation of the draft passing through the passageways 9.

In this specification and the claims forming a part thereof, I use the word "dome" as meaning a chambered cover in which collect the waste products of combustion and from which they are carried off.

Upon referring to Fig. 6 it will be seen that I show a water-chamber or boiler A constructed of two portions. As it is sometimes difficult to cast the water-chamber or water-boiler A in one section, I have found it sometimes advantageous to cast it in two sections. When I cast it in two sections, the lower section A^{30} will be cast separate from the upper section, and this upper section will be set upon the lower section. The said lower section is provided with an annular flange *a* to keep the upper section in place. This said annular flange is not essential. Of course the lower section A^{30} of the water-chamber is carried by the base 30, and is of course provided with the water connection *b*.

While I have described what I consider to be the best embodiment of my invention, I desire to be understood that the principles can be embodied in different forms, and I desire not to be limited beyond the requirements of the prior art and the terms of my claims.

What I claim as my invention is:—

1. In a hot-water furnace, the combination with a water-chamber having a central passageway, of a dome resting upon the top

of said water-chamber and provided with a central opening positioned above said passageway, and means by which a down draft is obtained and controlled through the said central opening of said dome down through the central passageway of said water chamber.

2. In a hot-water furnace, the combination with a water-chamber having a central passageway, of a dome resting upon the top of said water-chamber and provided with a central opening positioned above said passageway; a corrugated pipe held within said central passageway and positioned beneath the central opening of said dome, and means carried by said dome whereby the down draft between said corrugated pipe and said central passageway is regulated.

3. In a hot-water furnace, the combination with an outer water-chamber; an inner water chamber spaced apart from said outer water chamber and provided with a central passageway, and pipes connecting said water-chambers together, of a dome resting upon the top of said outer water-chamber and provided with a central opening positioned above the passageway through said inner water-chamber; a corrugated pipe held within the central passageway of said inner water chamber and positioned beneath the central opening of said dome, and means carried by said dome whereby the down-draft between said corrugated pipe and said central passageway is regulated.

4. In a hot-water furnace, the combination with an outer water chamber; an inner water chamber spaced apart from said outer water chamber and provided with a central passageway; pipes connecting said water-chambers together, and a combustion chamber surrounded by the bottom of said outer water-chamber, of a dome resting upon the top of said outer water-chamber and provided with a depressed central opening having a flanged edge which rests upon the top of said inner waterchamber; a corrugated pipe held within said water-chamber and positioned beneath the central opening of said dome, and means supported above the flanged edge of said central opening of said dome and the top of said corrugated pipe whereby the down draft between said corrugated pipe and said inner water-chamber into the combustion-chamber, is regulated.

5. In a hot-water furnace, the combination with an outer water chamber; an inner water chamber spaced apart from said outer water chamber and provided with a central passageway; pipes connecting said water-chambers together, and a combustion chamber surrounded by the bottom of said outer water-chamber: of a dome resting upon the top of said outer water chamber and provided with a central opening; a corrugated pipe held within said inner water-chamber and beneath the central opening of said dome; a cover for said corrugated pipe provided with closable openings; an oil-and-air conduit depending from said cover and surrounding said openings; means for feeding liquid fuel into said conduit; means carried by said conduit whereby the said liquid-fuel is prepared for combustion, and means whereby the down-draft through said cover into said oil-and-air conduit is regulated.

6. In a hot-water furnace, the combination with an outer water chamber; an inner water chamber spaced apart from said outer water chamber and provided with a central passageway; pipes connecting said water-chambers together, and a combustion chamber surrounded by the bottom of said outer water chamber; of a dome resting upon the top of said outer water chamber and provided with a central opening; a corrugated pipe held within said inner water-chamber and beneath the central opening of said dome: a cover provided with closable openings, carried by said dome and the top of said corrugated pipe whereby the draft down into the combustion chamber between said corrugated pipe and inner water-chamber is regulated; another cover for said corrugated pipe provided with closable openings; an oil-and-air conduit depending from said cover and surrounding said openings; means for feeding liquid fuel into said conduit; means carried by said conduit whereby the said liquid fuel is prepared for combustion, and means whereby the down draft through said cover into said oil-and-air conduit is regulated.

7. In a hot-water furnace, the combination with a water-chamber having a central passageway, of a dome resting upon the top of said water-chamber and provided with a central opening positioned above said passageway; a liquid-fuel burner supported within the passageway of said water-chamber, and means carried by said dome whereby a down draft is obtained through said liquid-fuel burner.

8. In a hot-water furnace, the combination with an outer water-chamber; an inner water chamber spaced apart from said outer water chamber and provided with a central passageway; pipes connecting said water-chambers together, and a combustion chamber surrounded by the bottom of said outer water-chamber; of a dome resting upon the top of said outer water-chamber and provided with a central opening positioned above the passageway in said inner water-chamber; a liquid-fuel burner supported within the passageway of said inner water-chamber, and means carried by said dome whereby a down draft is obtained through said liquid-fuel burner.

9. In a hot-water furnace, the combination with an outer water-chamber; an inner

water chamber shorter than said outer water chamber spaced apart therefrom and provided with a central passageway and pipes connecting said water-chambers together; of a dome resting upon the top of said outer water chamber and provided with a central opening positioned above the central passageway of said inner water chamber, and means whereby a down draft is obtained and controlled through the said central opening of said dome into and through the central passageway of said inner water-chamber.

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

DAVID JOHN ARCHER.

Witnesses:
N. LANGFIELD,
WM. S. JORDAN.