C. ATHERTON.

GAS FURNACE.

APPLICATION FILED MAR. 13, 1916.

1,224,700. Patented May 1, 1917.

Fig. 1.

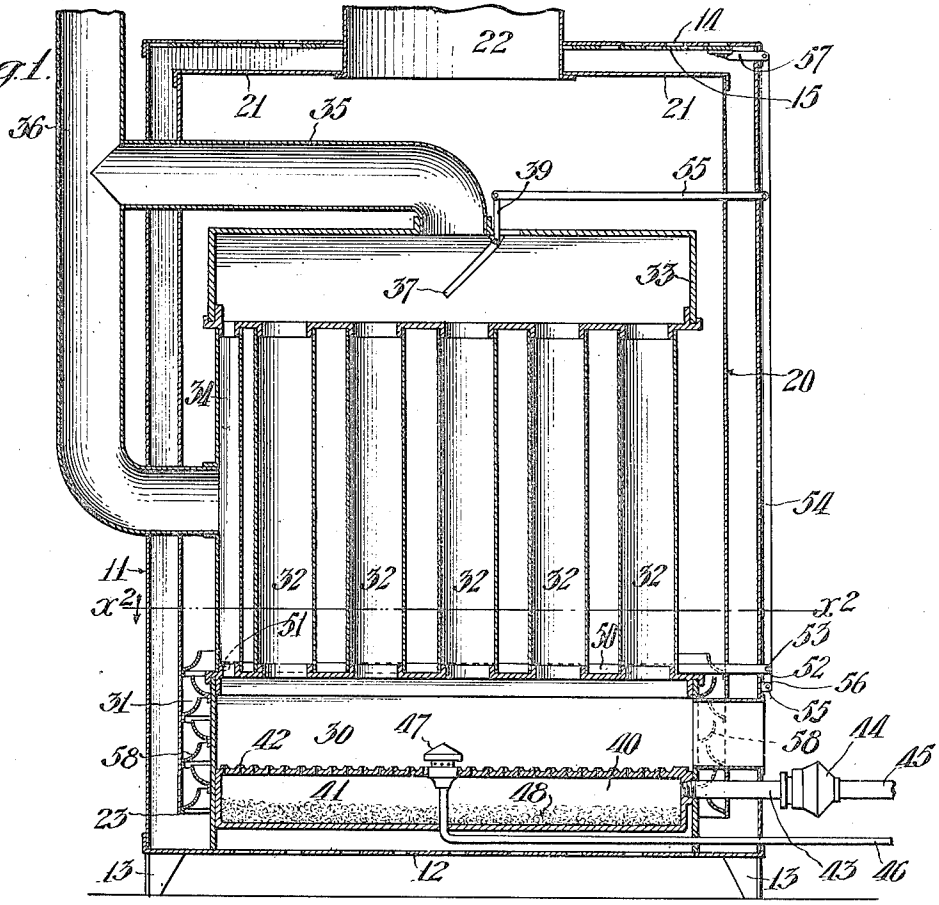
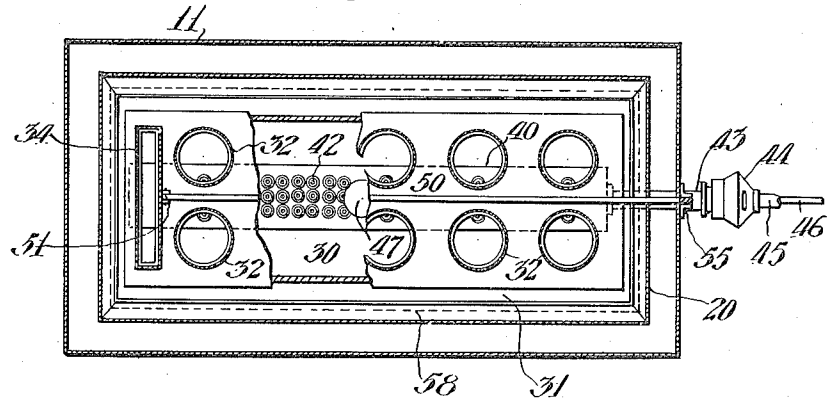


Fig. 2.



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UNITED STATES PATENT OFFICE.

CHARLES ATHERTON, OF PASADENA, CALIFORNIA, ASSIGNOR TO UNIT SYSTEM OF HEATING AND M'F'G COMPANY, OF PASADENA, CALIFORNIA, A CORPORATION OF CALIFORNIA.

GAS-FURNACE.

1,224,700. Specification of Letters Patent. Patented May 1, 1917.

Application filed March 13, 1916. Serial No. 83,988.

To all whom it may concern:

Be it known that I, CHARLES ATHERTON, a citizen of the United States, residing at Pasadena, in the county of Los Angeles and State of California, have invented a new and useful Gas-Furnace, of which the following is a specification:

My invention relates to gas furnaces, such as are used for heating air in buildings. In such furnaces it is very desirable to have a strong draft for starting, so that the various parts of the furnace and the chimney will be brought up to a good temperature at once. It is further desirable that this draft be decreased after the furnace has been in operation for some time, so as to prevent waste of fuel.

The first object of my invention is to provide a furnace which has a strong direct draft and a somewhat weaker indirect draft.

The second object of my invention is to provide means in such a furnace for automatically shutting off the direct draft after the furnace has been in operation for some time.

In gas furnaces of this general character, the furnace is entirely out of operation during the summer months, and furnaces of the ordinary type are objectionable in that they allow large quantities of cold air to enter the building through the air intake always provided in such furnaces.

The third object of my invention is to provide a large air inlet passage for supplying the air which is to be heated in such a furnace, and to provide means whereby these air inlets are automatically shut off whenever the furnace is not in operation.

The fourth object of my invention is to provide a furnace having an outer and an inner shell, the heating means being located in the inner shell, and air passages being so arranged that the maximum economy of heat is obtained.

The fifth object of my invention is to provide certain specific construction which will be described and claimed hereinafter.

Referring to the drawings, which are for illustrative purposes only:

Figure 1 is a longitudinal section of a gas furnace embodying my invention.

Fig. 2 is a section on line x^2—x^2 of Fig. 1, portions thereof being broken away to better illustrate the invention.

In these drawings, an outer shell 11 is provided, this shell having a bottom 12 mounted on suitable legs 13. Located in the top of the shell 11 are a plurality of air inlet ports 14, and an air inlet damper 15 is provided, this damper 15 being of such a shape and so located that it may be drawn to its extreme right hand position, as viewed in the drawings, and in that position will entirely open the air inlet ports 14. Secured to the outer shell 11 and symmetrically supported inside the shell is an inner shell 20, this shell having a top 21 in which is secured a register pipe 22, this register pipe 22 leading up to registers, not shown, which may be located in the walls or floor of the rooms to be heated. The bottom of the inner shell 20 terminates at a point 23 a small distance from the bottom 12 of the outer shell 11, so that air from the outer shell may pass freely into the inner shell 20. Located symmetrically inside the lower portion of the inner shell 20 and supported on the bottom 12 is a combustion chamber 30, this combustion chamber being rectangular and separated from the lower portion of the inner shell 20 by open spaces 31 in which baffle plates 58 are placed. Small openings are made in the bottom 12 inside the chamber 30 to supply air thereto. Secured in the top of the combustion chamber 30 are a plurality of cylindrical tubes 32, these tubes extending up and supporting a rectangular manifold 33, the tubes 32 providing an open communication between the top of the combustion chamber 30 and the bottom of the manifold 33. An indirect flue intake 34 connects the top of one end of the combustion chamber 30 with the bottom of the corresponding end of the manifold 33. A direct flue 35 connects a main flue 36 with the top of the manifold 33, a direct flue damper 37 being pivoted at 38 in such a position as to close the mouth of the direct flue 35. A direct flue damper lever 39 is connected to the direct flue damper 37, and extends through the top of the manifold 33 in the position shown in the drawings. Located inside the combustion chamber 30 is a burner 40, this burner having a gas space 41 which is in open communication with the interior of the combustion chamber through burner openings 42. The space 41 is supplied with a combustible mixture through a pipe 43 from a mixer 44 which is supplied with gas through a pipe 45. A gas pipe 46 supplies gas to a pilot 47

which is ordinarily left burning, the furnace being controlled by regulating the supply of gas supplied through the pipe 45. Inside the burner 40, in the bottom thereof, I place a supply of granular material 48. This granular material, ordinarily, is sand or gravel, and a sufficient amount is supplied to fill the burner 40 approximately half full. Located inside the inner shell 20, above the combustion chamber, is a thermostat rod 50, this rod being secured at one end 51, its other end 52 being free to move and being pivotally connected by a pin 53 to a thermostat lever 54. The thermostat lever 54 is pivotally connected by a pin 55 carried in a lug 56 which is secured to the outside of the outer shell 11. The thermostat lever 54 is connected to the direct flue damper lever 39 by means of a direct flue damper rod 55, and the thermostat lever 54 is connected through an air inlet damper rod 57 with the air inlet damper 15.

The method of operation of the invention is as follows:

The parts being in the position shown in the drawings, the pilot 47 is lighted. When it is desired to supply heated air to the room to be heated, gas is turned into the pipe 45, this gas being mixed with air in the mixer 44, passing through the pipe 43 into the space 41 inside the burner 40. The mixture of gas and air passes through the openings 42 into the combustion chamber 30 and is ignited by the flame from the pilot 47, so that the mixture burns inside the combustion chamber above the burner 40.

The products of combustion pass upwardly through the tubes 32 into the manifold 33, and pass directly into the main flue 36 through the direct flue 35. The supply of air to the outer shell 11 is shut off by the air inlet damper 15 which closes the air inlet ports 14. Comparatively little air is passed up through the register pipe 22, and the whole interior of the heater rapidly rises in temperature until the temperatures therein approximate their working values, the main flue 36 and the chimney to which it is connected being heated at the same time so as to provide an adequate draft. As soon as the interior of the heater reaches its working temperature, the thermostat rod 50 expands and forces the thermostat lever 54 to swing outward. The movement of the thermostat lever 54 is transmitted to the direct flue damper rod 55 which closes the direct flue damper 37 through the direct flue damper lever 39. At the same time, the air inlet damper 15 is pulled over by means of the air inlet damper rod 57 into such a position that the air inlet ports 14 are entirely opened and a copious supply of fresh air is admitted to the space between the outer shell 11 and the top 21 of the inner shell 20. This air passes downwardly through the space between the outer shell 11 and the inner shell 20, being partially heated therein by its contact with the outer walls of the inner shell 20. This air passes around the edge 23 and upwardly between the baffles 32 into the space inside the inner shell 20. The air passing through the open space 31 is forced by the baffles 32 to follow a tortuous path, being heated by the heat from the walls of the combustion chamber 30. The air having been admitted to the interior of the inner shell 20 is heated therein by the tubes 32 and by the indirect fuel intake 34 as well as by contact with the manifold 33. The heated air rises inside the inner shell 20, passing upwardly through the register pipe 22 to a register suitably located in the walls or floor of the room to be heated. Whenever heat is no longer needed, the supply of gas to the pipe 45 is shut off, and combustion in the combustion chamber 30 ceases, with the exception of the small flame of the pilot 47. The internal temperatures of the heater rapidly falls and the thermostat rod 50 contracts, thus opening the direct flue damper 37 and moving the air inlet damper 15 to its extreme left hand position, as viewed in the drawings, thereby completely closing the air inlet ports 14. The furnace is then in condition to exert a strong draft when lighted and at the same time the flow of cold air therethrough and into the register pipe 32 is prevented by the closure of the air inlet ports 14. Whenever heat is desired, the gas is turned on in the pipe 45 and the process is repeated.

The granular material 48 is supplied to prevent the supply of gas to the burner openings 42 from being too suddenly shut off. Whenever the burner is in operation gas enters the interstices of the granular material. When the supply of gas ordinarily delivered through the pipe 46 is shut off the gas and air trapped in the material 48 gradually filters out so that the flames of the openings 42 gradually die down and expire without an explosion.

I claim as my invention:—

1. In a gas furnace, an outer shell having air inlet ports in the top thereof, an air inlet damper so formed and located as to close said air inlet ports; an inner shell inside said outer shell; a register pipe secured in said inner shell in open communication with the interior thereof, said register pipe projecting through said outer shell; a manifold located inside said inner shell near the top thereof; a combustion chamber resting on the bottom of said outer shell and projecting into said inner shell, said bottom of said outer shell having an opening therethrough connecting the interior of the combustion chamber with the outer air; a plurality of tubes connecting the top of the combustion chamber with the bottom of the manifold;

burner means for producing hot gases in the combustion chamber; an indirect flue intake connecting one end of said combustion chamber with a corresponding end of said manifold; a direct flue passing through said outer and inner shells and connecting to the top of said manifold; a direct flue damper so located that it may be caused to close said direct flue; an indirect flue connected to a point in the side of said indirect flue intake between said combustion chamber and said manifold, said indirect flue passing through said inner shell and said outer shell and being connected into said direct flue outside said outer shell; a thermostat rod passing between said tubes above said combustion chamber and having one end secured in the heater and the other end projecting through said outer and inner shells; and means by which said rod operates said air inlet damper and said direct flue damper.

2. In a gas furnace; an outer shell having air inlet ports in the top thereof; an air inlet damper so placed as to open and close said ports; an inner shell located inside said outer shell, a space being left between said shells down through which the air from said air inlet ports can travel; a heating means inside said inner shell, said inner shell being perforated at its lower end to admit air to the space around said heating means; a register pipe secured to said inner shell and projecting through said outer shell; a thermostatic device in said inner shell; a direct flue for said heating means; a direct flue damper for said direct flue; means by which said thermostatic device operates said direct flue damper; and means by which said thermostatic device operates said air inlet damper.

In testimony whereof, I have hereunto set my hand at Pasadena, California, this 7th day of March, 1916.

CHARLES ATHERTON.