June 19, 1928. 1,674,213

A. F. McDOWELL

HEATING SYSTEM

Filed Oct. 18, 1926

Fig. 1

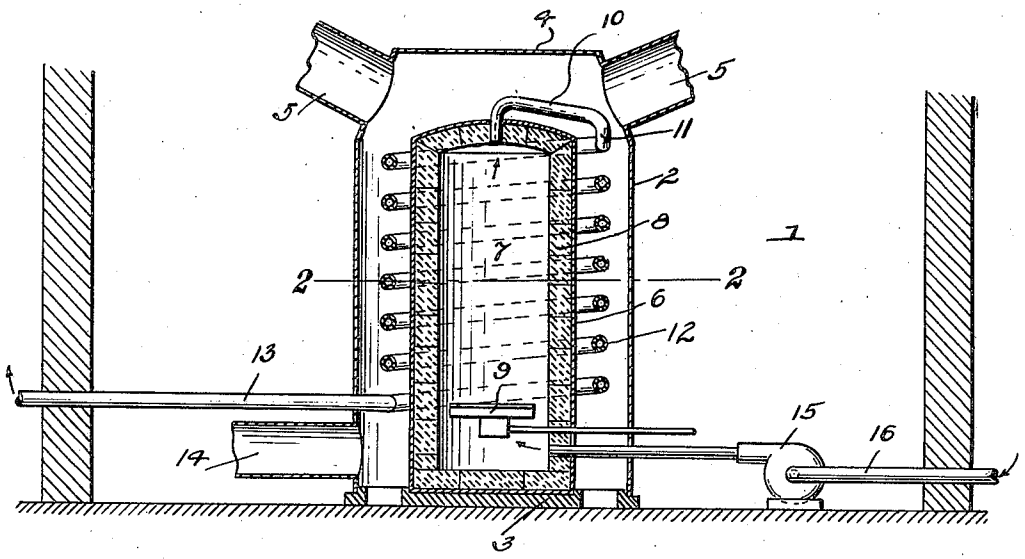
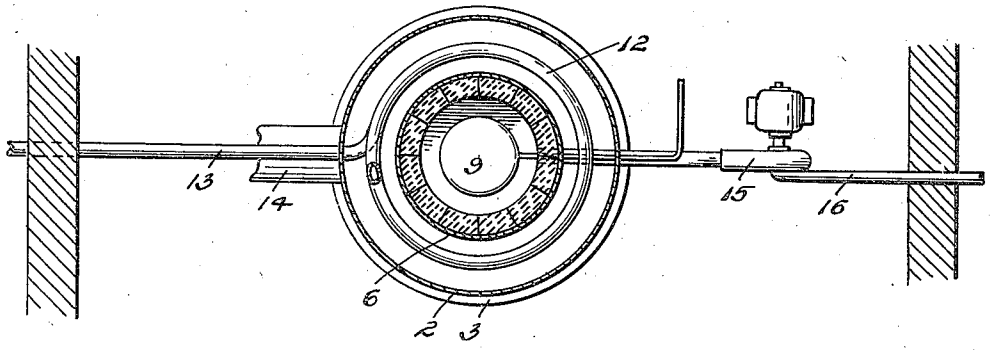


Fig. 2



Inventor

A. F. McDowell

By W. A. McDowell.

Attorney

Patented June 19, 1928. 1,674,213

UNITED STATES PATENT OFFICE.

ARCHER F. McDOWELL, OF COLUMBUS, OHIO.

HEATING SYSTEM.

Application filed October 18, 1926. Serial No. 142,229.

This invention relates to an improved heating system and to one especially adapted for use in connection with oil, gas or pulverized fuel burners, and wherein an improved circulation of the hot gases is provided, by means of which the heat units contained in the gases are absorbed by an independently circulated heating fluid in an efficient and complete manner without appreciable loss, and whereby economy is obtained in the fuel consumption of the heating system, together with substantially noiseless and odorless operation.

The invention is directed particularly to a heating system wherein is provided a casing formed with an internal combustion chamber in which active combustion takes place, the said casing being also provided with an internally situated heat exchanger which is spaced from said chamber but connected with the latter in such manner that there is effected a positive flow of the combustion products from said chamber and through the passages of the heat exchanger, the flow of the gases through the heat exchanger being preferably in counter current relation to the flow of the heating fluid around the heat exchanger, whereby a system is provided through the medium of which the heat of the combustion gases is effectively extracted or completely absorbed by the heating fluid to the end of providing a very efficient heating system wherein fuel consumption is maintained at a minimum.

Another object of the invention resides in a heating system of the character set forth wherein the combustion chamber and associated heat exchanger are of substantially air tight construction so that the gases generated in and passing through these units will be at all times completely sealed in a closed cycle of transit and positively prevented from intermingling with the heating fluid circulating in heat exchanging relationship about said units, the arrangement rendering the system odorless in operation as well as providing for efficient interchange in heat between the circulated fluids and also provides a system which is healthful and non-injurious since the burned gases are fully and completely delivered to the atmosphere beyond the region of heating.

With these and other objects in view as will appear as the description proceeds, the invention consists in the novel features of construction, combinations of elements and arrangements of parts hereinafter to be fully described and pointed out in the appended claims.

In the accompanying drawing:

Figure 1 is a vertical section taken through a heating system constructed in accordance with the present invention,

Figure 2 is a horizontal sectional view on the line 2—2 of Figure 1,

Referring more particularly to the drawings, the numeral 1 indicates my improved heating system in its entirety. In the particular form of the invention herein selected for illustration and description the system has been shown as comprising an outer casing 2, which rests upon a base plate 3 and is provided with a closed upper end 4 from which radiate the usual hot air conduits 5 leading to suitable heating zones. Arranged within the casing 2 is a combustion casing 6, formed to include an internal combustion chamber 7 of preferably air tight design. The casing 6 consists generally of an outer metallic wall, preferably formed from boiler plate or the like, and the walls of the chamber 7 are provided with a refractory lining 8 which is retained in position by the outer metallic walls. Within the chamber 7 there is arranged a burner 9, which may be of any suitable construction depending upon the particular kind of fuel utilized. In the present instance, however, the burner has been shown conventionally of the type used for burning oil, but it is obvious that any other type of burner may be employed for burning not only oil but gas or other fuels.

Communicating with the interior of the chamber 7 is a closed conduit 10 which leads to a heat exchanger 11. This unit may be one of several forms but for convenience in illustration and disclosure the same has been shown to comprise a vertically disposed coil 12 which is situated between the inner walls of the casing 2 and the outer walls of the casing 6. It will be observed that the conduit 10 communicates with the upper portion of the coil 12, thereby causing the combustion products discharged from the chamber 7 to circulate through said coil in a downward direction and to finally find exit from the coil by way of a discharge pipe 13 leading to any suitable point of vitiated gas delivery outside of the building. The casing 2, when the heating system is of the

so called hot air type, is provided contiguous to the bottom thereof with cold air inlet pipes 14, by which a heating fluid is introduced into the system and is permitted to circulate upwardly through the casing 2 in counter current flow with respect to the descending gases in the coil 12.

By this method of operation thorough heat interchange will exist so that the gases released from the coil by way of the discharge pipe 13 will be at approximately the same temperatures of the air entering the bottom of the casing 2 through the inlet pipes 14. In this manner the complete heat values of the combustion gases are absorbed by the heating fluid so that said fluid will possess proper temperatures when released from the casing for heating purposes. In the event that the chamber 7 is constructed so that the same is substantially air tight it is preferable to maintain the same at super-atmospheric pressures, such as by means of a fan or blower 15 in the air line 16, so as to cause the combustion gases to travel at efficient velocities in a downward direction through the coils of the heat exchanger. Comparable results can be obtained by employing suction apparatus in connection with the discharge pipe 13, maintaining thereby sub-atmospheric pressures within said chamber, or at least, within the coils of the heat exchanger. In steam or hot water circulating systems a liquid is used around the heat exchanger instead of a gas, but the principles of operation are substantially identical.

In view of the foregoing it will be seen that the present invention provides a heating system wherein complete and effective use is made of the heat generated or developed therein, avoiding especially waste of heat and its attendant uneconomical and inefficient conditions. Careful attention has been given in the past to the construction and design of oil and gas burners, but very little attention has been paid to the furnace or combustion chamber construction in which such burners are utilized. In fact, most oil burners, designed for domestic heating plants are installed merely in furnaces primarily adapted for coal burning purposes, with the result that a very large percent of the total heat generated passes off through the outlet flues without being used. The present invention, it will be observed, provides a peculiarly designed furnace for use in connection with such fuel burners for the specific purpose of extracting the full heat value of the combustion developed and to particularly prevent waste, with the end in view of enabling the conveniently handled fuels to be utilized at substantially the same cost as coal or equivalent fuel, when their present day prices are taken into consideration. It is preferable of course to provide the casing 2 with a heat insulating cover so as to minimize radiation losses of the heat within said casing.

Attention is especially directed to the air tight construction of the several units through which the gaseous products of combustion circulate, whereby these gases are sealed or confined within said units, and are prevented from commingling with the independently circulated heating fluids, thus providing a safe and odorless construction.

What is claimed is:

1. In a heating system, a casing provided with an air tight combustion chamber, means for maintaining combustion within said chamber, a heat exchanger arranged within said casing, means for effecting a positive flow of combustion products from said closed chamber and through the heat exchanger and for maintaining pressures within said chamber abnormal with respect to atmospheric pressures, and means for circulating a heating fluid around said exchanger in spaced and opposed relation to the direction of flow of said combustion products.

2. In a heating system, an outer casing, a casing arranged within said outer casings and provided with an air tight combustion chamber, a fuel burner arranged within said chamber for supporting combustion within the latter, a heat exchanger arranged between said outer and inner casing, means for positively circulating products of combustion led from said chamber through said heat exchanger and for maintaining pressures within said chamber and heat exchanger abnormal with respect to atmospheric pressures, and a cold air inlet provided in connection with the bottom of said outer casing and operative to permit of the circulation of a heating fluid around said heat exchanger.

3. In a heating system, a furnace comprising an outer casing, a casing arranged within said outer casing and provided with an air tight combustion chamber, means arranged within said inner casing for maintaining combustion therein, a heat exchanger situated between the walls of said inner and outer casing, positively acting means for circulating the products of combustion obtained from said chamber in a downward direction through said heat exchanger, said means serving to maintain pressures within said chamber and heat exchanger abnormal with respect to atmospheric pressures, and means for introducing a fluid to be heated into the bottom of said furnace and into contact with the walls of said heat exchanger while the fluid is moving in an upward direction.

4. In a heating system, a furnace comprising an outer casing, a casing arranged within said outer casing and formed to include an air tight combustion chamber, means for

maintaining combustion within said chamber, a heat exchanger comprising a coil disposed between said inner casing and the walls of said outer casing, positively acting means for effecting a forced circulation of the products of combustion developed in said chamber through said coil in a substantially downward direction, said means serving to maintain pressures within said chamber and heat exchanger which are abnormal with respect to atmospheric pressures, and a cold air inlet provided in the bottom of said furnace and serving to admit air into said outer casing and to permit the same by travelling upwardly to engage with and absorb the heat radiated from the external walls of said heat exchanger.

5. In a heating system, a casing including an air tight combustion chamber, means for maintaining substantially smokeless combustion within said chamber, means for maintaining super-atmospheric pressures within said chamber, and a heat exchanger through which is circulated the highly heated gases generated in the combustion chamber.

6. In a heating system, a casing including an air tight combustion chamber, means for maintaining substantially smokeless combustion within said chamber, means for maintaining pressures within said chamber abnormal with respect to atmospheric pressures, and a heat exchanger to which the products of combustion from said chamber are delivered in full.

7. In a heating system, a casing having an air tight combustion chamber formed therein, means for maintaining substantially smokeless combustion within said chamber, sealed air and fuel supplying connections entering said chamber, a heat exchanger through which is circulated substantially the entire volume of the heated gases developed in said chamber, and an outlet from said exchanger leading to the exterior of the building in which the heating system is situated and a conduit in connection with said chamber and leading to the exterior of the building.

8. In a heating system, a casing including an air tight combustion chamber, an air supply pipe entering said chamber and extending from the exterior of the building in which the heating system is situated, the entire supply of air to said chamber being provided through the air supply pipe, a sealed oil inlet pipe entering said chamber, a burner connected with the oil supply pipe and disposed within said chamber, a heat exchanger in the form of a coil connected with said chamber and arranged exteriorly of said casing through which the products of combustion developed within said chamber are entirely circulated in a downward direction, an air exhaust conduit connected with the discharge side of said heat exchanger coil and leading to the exterior of the building in which the heating system is situated, and means for maintaining pressures within said chamber and heat exchanger which are abnormal with respect to atmospheric pressures.

In testimony whereof I affix my signature.

ARCHER F. McDOWELL.