Feb. 11, 1941. E. E. ELMORE 2,231,258

HEATING SYSTEM

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Fig. 1

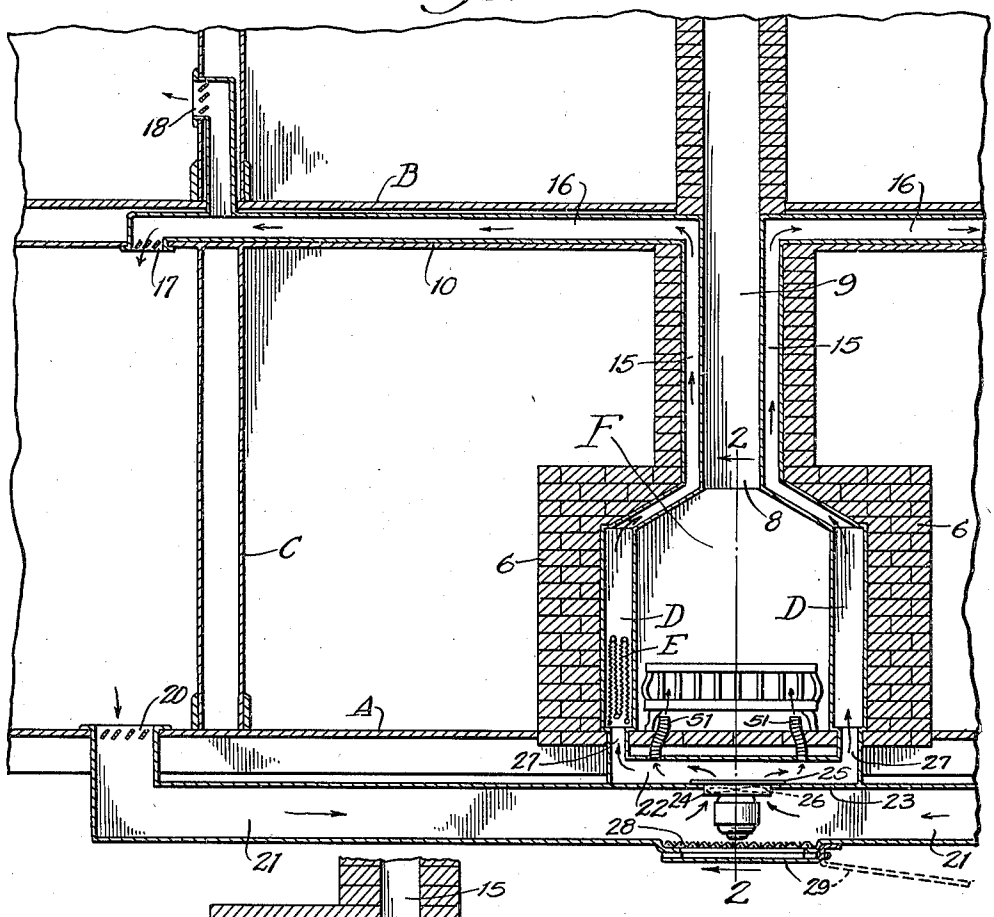


Fig. 2

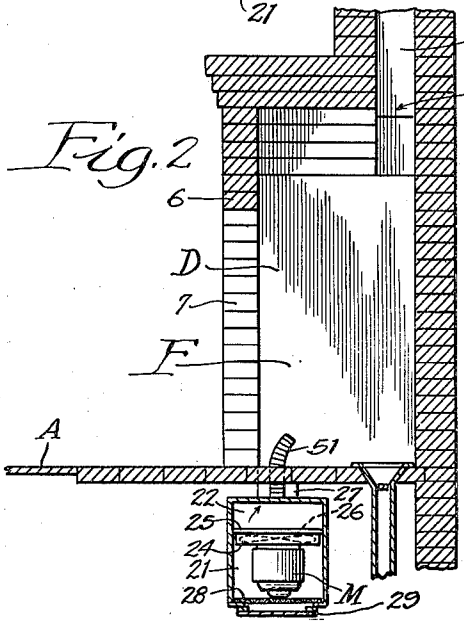
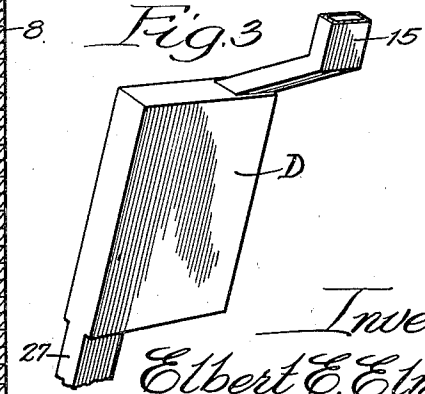


Fig. 3



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Fig. 4

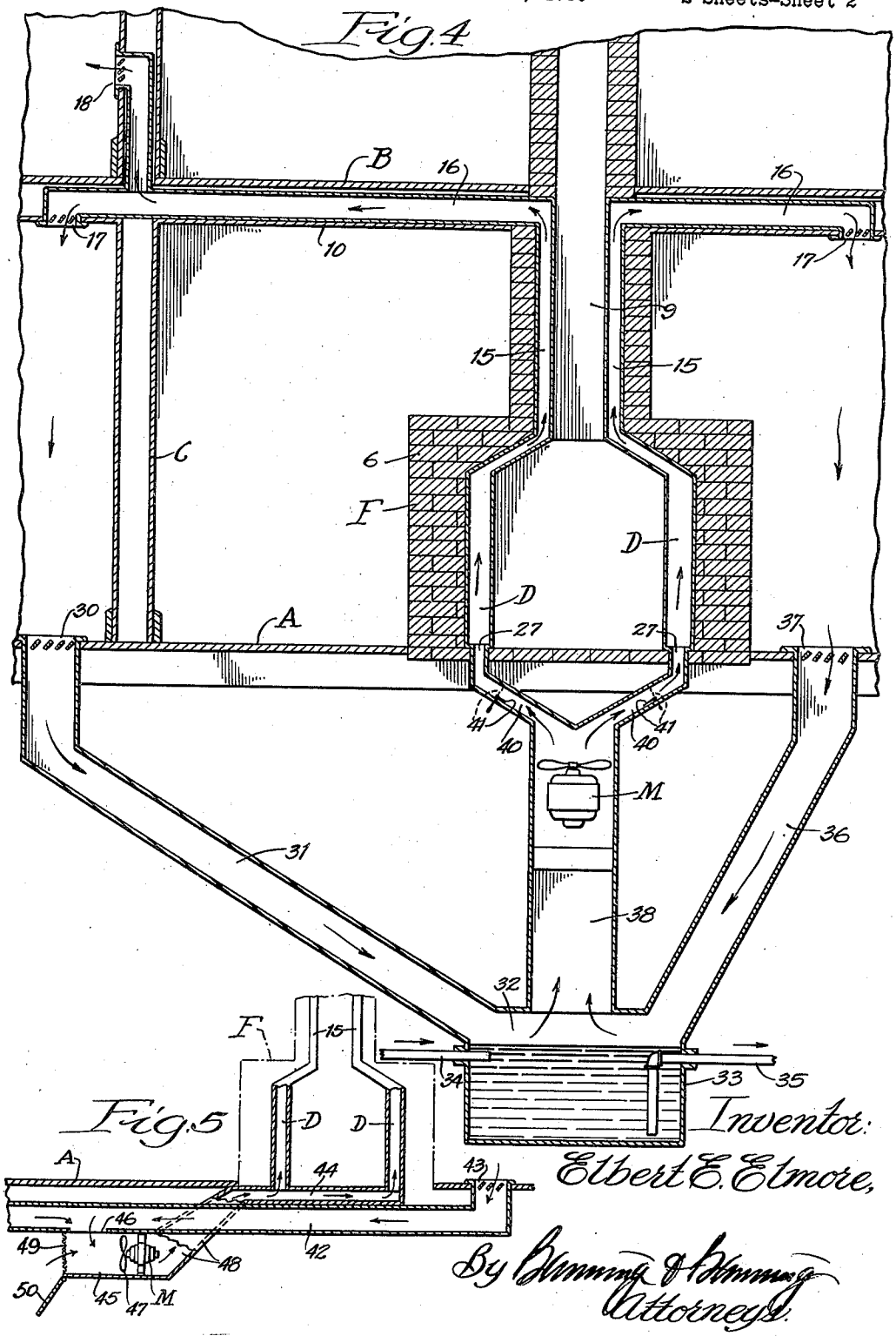


Fig. 5

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2,231,258

UNITED STATES PATENT OFFICE

2,231,258

HEATING SYSTEM

Elbert E. Elmore, Tinley Park, Ill., assignor, by mesne assignments, of one-half to Grover C. Elmore, Chicago, Ill., and one-half to Margaret Elmore, Tinley Park, Ill.

Application March 25, 1939, Serial No. 264,079

6 Claims. (Cl. 237—51)

My invention relates to a heating (and cooling) system operable in conjunction with a conventional fireplace such as is commonly found in homes or other buildings. The improvements hereinafter described are advantageous for use where the system is to furnish auxiliary heat, or where on account of climatic conditions only a moderate amount of heat is required.

For its objects, my invention aims to provide a heating system which may utilize heat from fuel which is burned in an open fireplace, and circulate such heat to desired points of discharge into the building; a system which is relatively inexpensive to install and maintain, and the presence of which may be effectively concealed; a system in which provision may be made for humidification of the heated air which is discharged into various rooms of the building rooms; and a system which may be converted into a cooling system, when the weather is warm, without requiring any adjustments other than the opening or closing of certain dampers. These and other objects as will hereinafter appear, may be realized from a heating system such as is described in the accompanying drawings wherein—

Figure 1 is a vertical section through two floors of a building, showing therein a fireplace and chimney with which is incorporated certain drums into which heat is conducted from the fireplace, together with a system of ducts, both discharge and return, by which heated air is delivered to distant points and cool air is returned to be heated in the drums for recirculation through the system;

Fig. 2 is a detail in section taken on line 2—2 of Fig. 1;

Fig. 3 is a view in perspective of one of the heating drums which is adapted for fitting against a side of the fireplace;

Fig. 4 which is a view similar to Fig. 1 shows a generally similar heating system with which is incorporated a humidifier; and

Fig. 5 which is a detail in section shows a modification of the duct system by which to provide for circulating cool air.

Referring particularly to Figs. 1–3, I have shown a fireplace F constructed of brickwork 6 or other refractory material, having an open side 7 through which heat may pass into the room. Extending upwardly from the rear of the fireplace is a flue 8 passing through a chimney 9 and out through the roof (not shown). The fireplace is located upon one floor A above which is a second floor B with a ceiling 10 in spaced relation therebelow, and a partition C is shown whereby to provide separate rooms, all as is common in buildings of the present time.

Fitted into the fireplace is a heating drum D which may conveniently be made of sheet metal. This drum is in the form of a narrow enclosure adapted to be fitted against one side of the fireplace so as to occupy a relatively small space therein. A second drum similar to the first, except that the ducts connected therewith are reversed, is adapted to be fitted into the opposite side of the fireplace. Each drum which is closed on all sides is provided with openings on its top and bottom, adjacent its rear and front walls, respectively, where connections are made with certain ducts now to be described.

A vertical duct 15 in connection with each drum top opening extends first obliquely along the hearth roof and then upwardly along one side of the flue which is desirably of sufficient width to accommodate the two ducts with little or no reduction in the flue cross sectional area below that which is required for effective draft.

Connecting with each vertical duct is a lateral duct 16 which may be disposed between the floor B and ceiling 10 therebelow, or over the joists of a ceiling as in the case of an attic floor. The lateral duct proceeds on to desired points where discharge openings each controlled by a register may be provided. As shown, one such opening 17 is located in the ceiling of an adjacent room, and another opening 18 in a room on the floor above that where the fireplace is situated. It will accordingly be noted that the heated air within either or both of the two drums may be circulated through the vertical and lateral ducts to desired points of discharge so that rooms which are remote from the fireplace may receive heat therefrom.

I have also shown as part of this system a floor register 20 which may be located at any effective point, this register being fitted into the inlet end of a return duct 21 which extends horizontally below the floor A to a point adjacent a chamber 22 which lies below the fireplace hearth or floor. The wall 23 which separates the return duct from this chamber is provided with an opening wherein is fitted a frame 24 having a flange 25 which overlies the wall so as to furnish support therefor. In connection with the frame is a motor M driving a fan 26 which draws air through the return duct and then forces it on into the chamber from whence it passes upwardly into connecting ducts 27 for delivery into the two drums D. A constant cir-

culation of air may accordingly be maintained, the air being heated as it passes through the drums on its way for discharge at desired points throughout the building, and then returning through the ducts 21 for recirculation and reheating in the manner already described.

Below the motor I have shown an opening over which is fitted a screen 28 below which is a hinged damper 29 adapted, when closed, to prevent entrance of air therethrough. When the system is operated for heating purposes only, the door is kept closed but for purposes of cooling, when the fireplace is not used, the damper may be opened so as to permit entrance of cool air through the screen 28 where it is filtered, preliminary to circulation through the system in the same manner as when heated air is forced therethrough. Accordingly, the only adjustment necessary for converting the system from one which heats to one which cools is to open or close the damper 29, it being presumed in this connection that use of the fireplace will be confined to the heating season.

In Fig. 4 I have shown a generally similar system with drums D arranged at opposite sides of the fireplace with connecting ducts extending upwardly therefrom and thence horizontally to discharge points at selected points in the building. In this construction the floor register 30 is placed over the entrance to a return duct 31 which leads to a closed chamber 32 over a tank 33 wherein water may be maintained at a fixed level as by entering through a pipe 34 and leaving through an outlet pipe 35. Other ducts may also lead to the chamber 32 as, for example, the return duct 36, the entrance to which is fitted with a register 37 in another room.

Extending upwardly from the tank chamber is a vertical duct 38 wherein I have mounted a motor M driving a fan 39 whereby air which is laden with moisture from the water contained within the tank is delivered into branch ducts 40, one in communication with each drum D. A damper 41 may be placed in each branch duct whereby to close the passage through one of them in case it be desired to operate with only one duct system and not both (or all, if more than two systems of ducts be employed). The operation of this system is the same as that already described, there being this difference, however, that provision is made for humidifying the heated air which is circulated and recirculated throughout the building. If in place of water in the tank a dehumidifying agent, such as chloride of lime, be used, the moisture content in the air will be reduced with a consequent decrease in temperature.

In Fig. 5 I have shown on a reduced scale a modified construction of the system first described. Here it will be noted a return duct 42, into which air flows from one or more registers 43 located at desired points, underlies the chamber 44 which is in communication with the two drums D. Below this chamber is a box 45 communicating with the return duct 42 through an opening 46. In the box I have mounted a motor M driving a fan 47, the box being in communication with a duct 48 which passes obliquely to one side of the return duct for connection with the chamber 44. At one end of the box is a screen 49 through which cool air may be relieved of its foreign particles while passing into the box for circulation with the aid of the fan through the duct 48 and chamber 44 which communicates with the drum D. A damper 50 may be swung up against the screen to close the opening whereby to shut off the cool air which otherwise would enter the system.

In Fig. 1 I have illustrated in one of the drums certain electrical heating coils E adapted, when connected to a source of energy, to provide heat therewithin entirely independent of the heat which may be received by conduction from the fire within the fireplace. Such an auxiliary heating means may have advantage, particularly in regions where a low cost prevails for electricity and only a moderate amount of heat is required within the building. Also, as by the use of short tubes 51 which lead from the chamber 22 through the fireplace floor to a point below the fireplace basket or other fuel support, I am able to deliver a constant supply of air with which to support combustion—a very important consideration with certain fuels, such as anthracite coal, which do not burn readily or evenly, although yielding much heat when combustion is aided as by the means just described.

It will be observed that the present heating system is auxiliary to a fireplace with the advantage that it may circulate heated air to distant points in the building—something which a fireplace alone cannot do. Also the system may function independent of the fireplace to circulate cool air throughout the building. The same connecting ducts suffice for both purposes. Provision for humidifying or dehumidifying the circulated air is also made without requiring any complicated or moving parts.

The advantages of the present heating and cooling system have been demonstrated in extensive experience, particularly in homes of the modest type. As shown, the two drums are united into a single system, but obviously the ducts in communication with one drum may be operated entirely separate and independent from those in communication with the other drum, as by closing the shutters of the registers 25 or 45. By so proceeding either of the two systems of ducts may be used separately.

I claim:

1. In a heating system, the combination with a building having a plurality of separate rooms and equipped with an open fireplace located in one of the rooms, of a pair of separate drums each positioned adjacent a wall of the fireplace, a duct leading from each drum to separate rooms remote from the room in which the open fireplace is located, the duct of each drum being supplied with hot air independently of the duct of the other drum, whereby an equal distribution of heat will be effected and rooms remote from the fireplace will be uniformly heated.

2. In a heating system, the combination with a building having a plurality of separate rooms and equipped with an open fireplace located in one of the rooms, of a pair of separate drums each positioned adjacent a wall of the fireplace, a duct leading from each drum to separate rooms remote from the room in which the open fireplace is located, the duct of each drum being supplied with hot air independently of the duct of the other drum, whereby an equal distribution of heat will be effected and rooms remote from the fireplace will be uniformly heated, and return ducts from said remote rooms communicating with each other and with each drum.

3. In a heating system, the combination with a building having a plurality of separate rooms and equipped with an open fireplace located in one of the rooms, of a pair of separate drums each positioned adjacent a wall of the fireplace,

a duct leading from each drum to separate rooms remote from the room in which the open fireplace is located, the duct of each drum being supplied with hot air independently of the duct of the other drum, return ducts from said remote rooms communicating with each other and with each drum, means for closing one return duct against the passage of air therethrough, and means for forcing air through the remaining duct into the drum connected therewith whereby to promote a circulation of air therefrom to one of the remote rooms.

4. In a heating system, the combination with a building having a plurality of separate rooms and equipped with an open fireplace located in one of the rooms, of a pair of separate drums each positioned adjacent a wall of the fireplace, a system of discharge and return ducts from said separate remote rooms in communication with each drum, the discharge duct of each drum being supplied with hot air independently of the discharge duct of the other drum whereby an equal distribution of heat will be effected and rooms remote from the fireplace will be uniformly heated, a chamber interconnecting the return ducts and the two drums, means for closing off the connection to either drum, and mechanical means for forcing a circulation of air from the interconnecting chamber through the drum in communication therewith and therebeyond for discharge in one of the remote rooms.

5. In a heating system, the combination with a building having a plurality of separate rooms and equipped with an open fireplace located in one room, of a pair of separate drums each positioned adjacent a wall of the fireplace, a duct leading from each drum to separate rooms remote from the room in which the open fireplace is located, the duct of each drum being supplied with hot air independently of the duct of the other drum, whereby there will be an equal distribution of hot air and a uniform heating of rooms remote from the room in which the fireplace is located, return ducts from said remote rooms communicating with each other and with each drum, a water tank interposed in the return ducts at their point of communication with each other for yielding moisture to the air circulated through said ducts.

6. In a heating system, the combination with a building having a plurality of separate rooms and equipped with an open fireplace located in one of the rooms, of a pair of separate drums each positioned adjacent a wall of the fireplace, a duct leading from each drum to separate rooms remote from the room in which the fireplace is located, the duct of each drum being supplied with hot air independently of the duct of the other drum, whereby there will be an equal distribution of hot air and a uniform heating of said remote rooms, return ducts from said remote rooms communicating with each other and with each drum, a conduit leading from the return ducts to a point of discharge adjacent the fireplace floor, and a support for fuel in the fireplace positioned adjacent the discharge point of said conduit, whereby air will be supplied for supporting combustion of fuel on said support.

ELBERT E. ELMORE.