Aug. 22, 1944. E. G. SIEGLER ET AL 2,356,705

HEATER

Filed Oct. 20, 1941 2 Sheets-Sheet 1

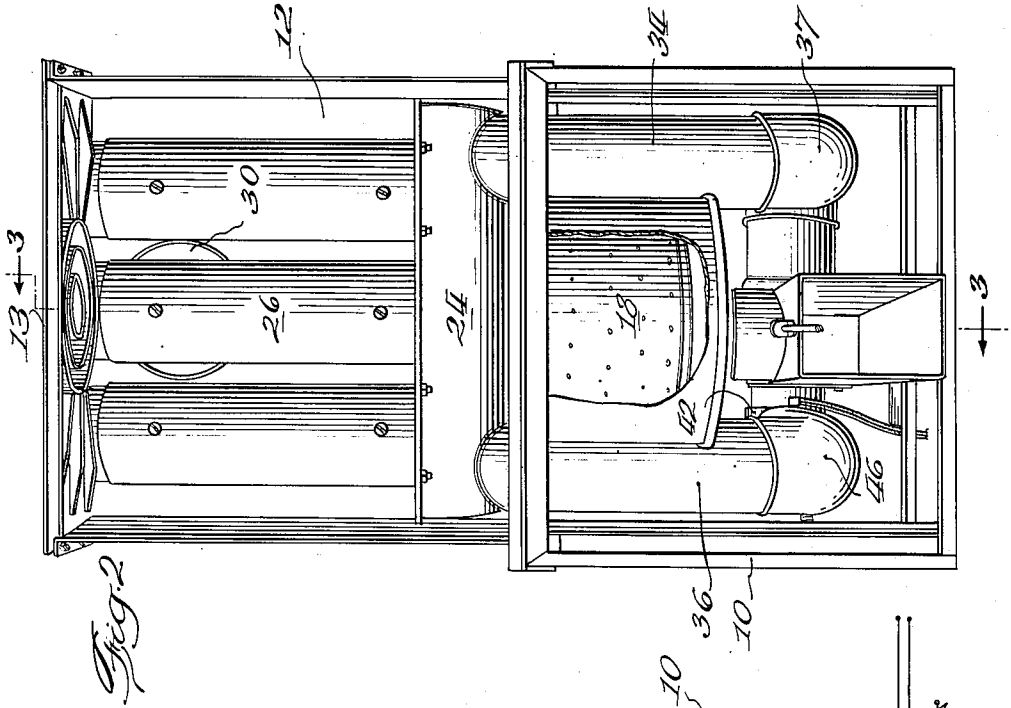

Fig. 2.

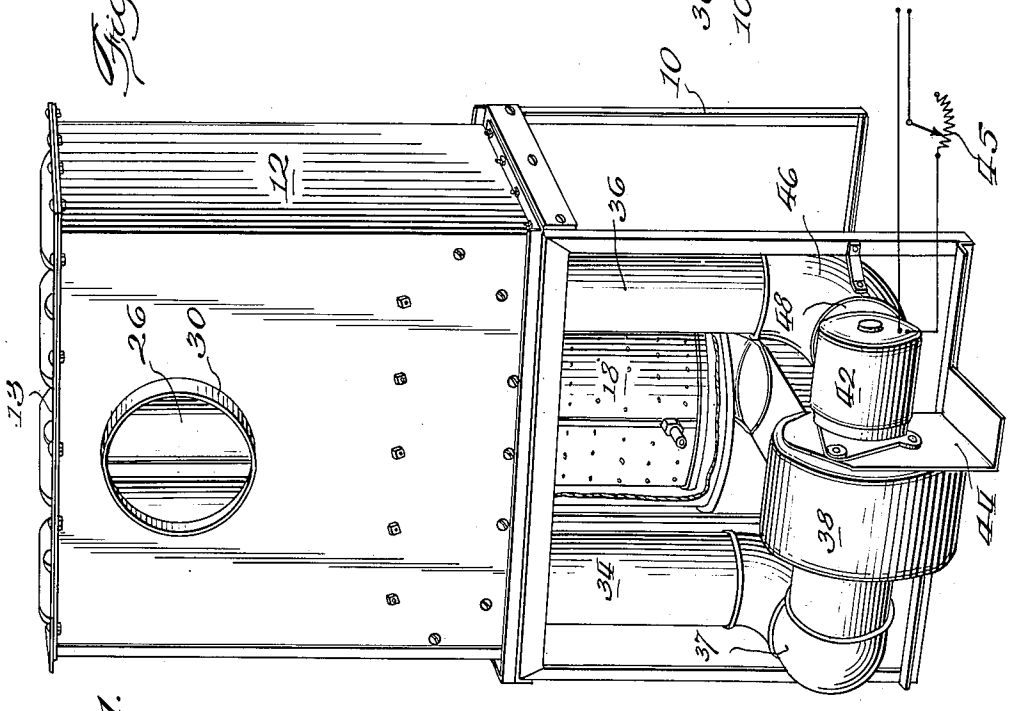

Fig. 1.

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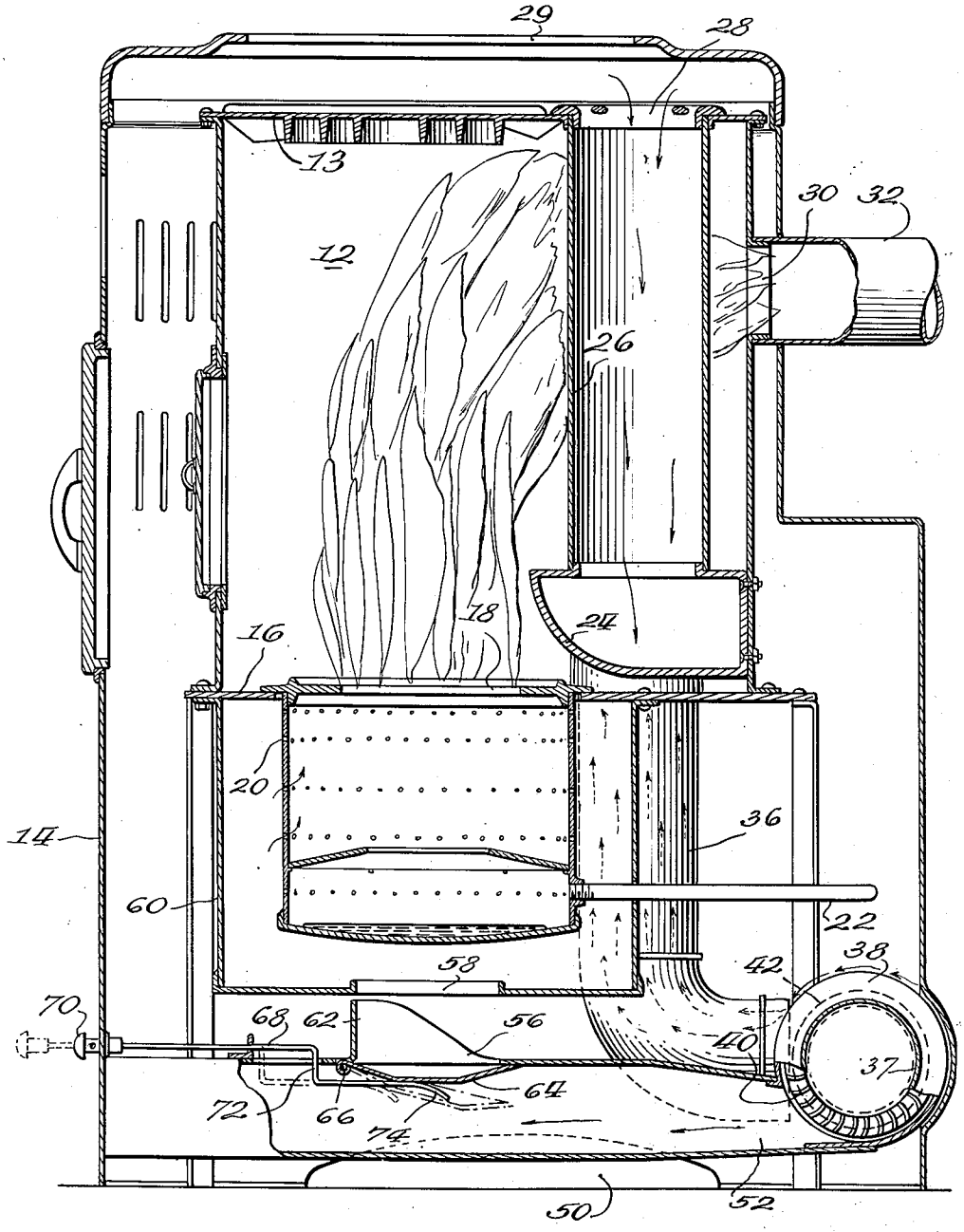

Fig. 3.

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2,356,705

HEATER

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Application October 20, 1941, Serial No. 415,692

4 Claims. (Cl. 126—110)

The present invention relates to heaters and is more particularly concerned with the provision of an oil burning room heater having either high or low heating capacity as desired, and which has other novel features that will be pointed out presently. This invention is not, however, limited specifically to oil or other liquid fuel heaters, since many of the features thereof are equally applicable to heaters using other types of fuels, such as those which burn coal, wood or gas, for instance.

This application is a continuation in part of our earlier application Serial No. 406,620 filed August 13, 1941, for Heaters.

It is an object of the present invention to provide a novel hot air room heater which is adapted to heat and circulate air within the room in which the heater is positioned and in adjacent rooms either by convection or by forced circulation.

An additional object is to provide a room heater with novel means which particularly adapts the unit for heating in all types of weather, including weather in which poor draft conditions are encountered.

Still another object of the present invention is to provide a heating unit of relatively small size having an extremely high heating capacity.

An additional object is to provide a combination forced circulation and convection heater in which incoming air serves to cool the motor regardless of whether the motor is operating or not.

An additional object is to provide a novel heater of the type above described which is adapted to circulate heated air throughout several adjoining rooms by means of forced circulation.

Still another object is to provide a novel arrangement for forcing the draft of a heating unit having the advantages mentioned above.

Yet another object of the present invention is to provide a unit heater of the type described in which the air circulated through the heating unit may be forced, or alternatively if desired, air may be circulated through the unit by convection, and in which no dampers are necessary to change the operation of the heater from forced circulation to convection circulation.

Still another object of the present invention is to provide an improved heater having a motor driven blower means for forcing the circulation of air therethrough and in which the heater can be converted to a convection heater by the expedient of merely deenergizing the blower motor.

Still another object is to provide a heater of the type described having extremely high heating efficiency and extremely high heat output.

Another object of the present invention is to provide a heater having means for heating a portion of the air drawn thereinto and for mixing this heated air with substantially unheated air and for projecting the mixed air into the room.

Another object of the present invention is to provide a room heater operable alternatively as a forced circulation heater or as a convection heater and wherein all of the air to be heated is heated directly by the heater when the device is heating by convection, while when the heater is operating by forced circulation a portion of the air is heated to a high temperature and this high temperature air is tempered by the admixture thereto of cool air before being projected from the heater.

Other objects and advantages will become apparent from the following description of a preferred embodiment of our invention illustrated in the accompanying drawings, in which similar characters of reference refer to similar parts throughout the several views.

In the drawings:

Fig. 1 is a rear quarter perspective view of a heater embodying the present invention shown with the cabinet removed;

Fig. 2 is a front perspective view of the portion of the apparatus shown in Fig. 1; and

Fig. 3 is a vertical transverse sectional view taken from front to back through the heater shown in Figs. 1 and 2. Fig. 3, however, includes the heater cabinet.

Referring to the drawings. The heater there shown and embodying the present invention is comprised of a channel iron generally rectangular frame 10, which serves as a base and supports a rectangular sheet metal combustion chamber 12 having a cast iron top 13. The base and the combustion chamber and other elements to be described presently are enclosed within a sheet metal housing or cabinet 14, which in general conforms to the shape of the working structure, excepting that its side walls are spaced somewhat away from the combustion chamber 12, so as to diminish the transfer of heat directly from the combustion chamber walls to the outside through the cabinet walls.

The lower portion of the combustion chamber 12 is closed by a plate or floor 16 provided with a comparatively large circular opening within which is secured the upper portion of a pot type burner 18. This burner 18 is of the

well-known type in which a generally cylindrical fire pot is provided around its vertical surface with a multiplicity of apertures 20 and into which oil may flow at a regulated rate. This oil burns and heats the side walls of the burner sufficiently to vaporize the fuel so as to provide good and rapid combustion while air to support this combustion flows inwardly through the apertures 20 and thus prevents overheating of the side walls. The burner 18 is connected by means of a fuel inlet pipe 22 to suitable flow regulating and fuel storage means not shown inasmuch as they may be of any well-known design. A suitable arrangement is shown in Patent No. 2,238,345 issued to the present inventors on April 5, 1941.

The hot products of combustion from the burner 18 pass around a cast iron transversely extending trough-shaped manifold 24 and around three generally cylindrical cast iron tubes 26 which are connected to the manifold 24 and which extend upwardly and communicate with the air in the room outside of the heater at the top thereof through openings 28 and a grill 29.

The rearward wall of the combustion chamber 12 is provided with an opening 30 through which the products of combustion pass outwardly of the stove through a stovepipe 32 to a stack not shown. Thus, during operation of the burner, hot gases will heat the manifold 24, and the vertical pipes 26, and then will pass outwardly through the stovepipe 32.

The manifold 24 is provided at each end with openings in its lower surface which are connected to a pair of downwardly extending conduits 34 and 36. One of these conduits, indicated by the numeral 34, is connected at its lower end to a pair of elbows 37 which, in turn, are connected to the inlet side of a centrifugal blower 38. The impeller 40 of this blower is driven by an electric motor indicated by the numeral 42 which is secured to and extends outwardly from the side of the blower opposite its inlet opening. This blower is supported upon a suitable bracket 44 connected in turn to the frame 10. The output of the blower is variable since the motor speed can be determined by means of a speed control circuit and rheostat 45.

The other downwardly extending conduit 36 is connected to a forwardly extending elbow 46 which has its open end 48 positioned directly behind the motor 42. Air flowing inwardly through this conduit therefore serves to cool the blower motor regardless of whether the motor is operating or not, since as will appear presently, air always flows inwardly through this conduit when the burner is operating. The lower portion of the cabinet 14 which surrounds the stove proper has its side walls formed to provide arches 50 to permit the entrance of air into the heater. The exhaust side of the blower 38 is connected to a forwardly extending conduit 52 which extends to the front wall of the cabinet and communicates with outlet openings in this wall.

From the above, it will be seen that with the blower 38 operating, air is drawn from one end of the manifold 24 into the blower 38, and is blown outwardly from the cabinet through openings communicating with the conduit 52. This air blows horizontally out across the floor of the room to be heated in a position near the floor for a considerable distance before rising. This movement of air creates a sub-atmospheric pressure in the manifold 24 and thus causes air from the room to flow inwardly at the top of the stove through the openings 28 and also simultaneously causes cool air from near the floor to flow inwardly through the lower inlet opening 48. The air passing inwardly at the openings 28 moves downwardly through the cylindrical heat exchange pipes 26 and into the manifold 24. This downwardly moving air therefore reaches the manifold at a high temperature, while air flowing upwardly to the manifold 24 through the conduit 36 reaches the manifold at substantially room temperature. The hot air and the cool air are thus mixed in the manifold before passing outwardly through the conduit 34 and blower 38.

This invention, it will be seen, provides a simple means for moving large quantities of air to be heated and for heating a portion of this air and for tempering this heated portion before passing it outwardly of the stove. Since a large quantity of air is moved, it will be appreciated that this air can be blown a substantial distance away from the stove without rising. Also, the fact that this air is not extremely hot will aid in preventing the air from rising rapidly after it leaves the heater. A heater constructed as described will have a large heating capacity even though the air leaving the heater is not extremely hot, since a large quantity of warm air will have the same heating effect as a smaller quantity of hot air and will have the advantage of permitting better distribution of heat within the room.

When it is desired to use the heater in the manner of an ordinary convection heater, it is necessary merely to deenergize the motor 42. Under these conditions, air passes inwardly through the lower opening 48 and upwardly through the conduit 36 into the lower manifold 24. Some air also passes inwardly through the openings in the front cabinet wall, through the conduit 52, through the blower 38 and upwardly through the conduit 34 into the lower manifold 24. Air from both of these sources is heated within the manifold 24 and passes upwardly through the vertical cylindrical heat exchange tubes 26 where it is further heated before passing outwardly into the room through the upper openings 28 that serve as inlet openings when the blower is operating.

Of course whether the heater is heating by forced circulation or by convection, some additional air not mentioned above will be heated directly by the walls of the combustion chamber. This air enters through the arches 50 and passes outwardly through the grill 29 and the louvers in the upper portions of the cabinet walls.

Under certain atmospheric conditions the ordinary draft effect produced by the stovepipe and stack arrangement may not be sufficient to provide proper combustion of the fuel. These conditions arise principally in the spring and autumn when some heat is needed, although the outside temperatures are comparatively moderate. The effect produced by such weather is frequently about as follows: Although heat is desirable in the house, the temperature differential between the gases in the stack and the outside air is not sufficient to provide rapid enough movement of the gases in the stack to supply sufficient draft. In a stove of the present type which operates at extremely high efficiency, the gases in the stack will be of a lower temperature than will the gases exhausting from a less efficient stove. Therefore, in a high efficiency heater the conditions above mentioned are aggravated.

In order to provide a proper draft under these adverse conditions, we provide the conduit 52

with an opening 56 positioned beneath the opening 58 in a conventional air distributing casing 60 which surrounds the burner 18. Around a portion of the opening 56 and especially at the forward edge of this opening, a shield 62 is provided to deflect air issuing from the opening 56 upwardly into the opening 58. The flow of air through the opening 56 can be determined by a damper 64 attached at the forward edge of the opening 56 by a hinge 66. The position of this damper is regulated by a push rod 68. The outward end of this push rod which extends through the cabinet wall 14 is provided with a knob 70 by means of which the rod 68 can be moved in an endwise direction. At its rearward end the push rod 68 is connected to an L-shaped finger 72 which extends downwardly into a position beneath the hinge 66. The forward end of this finger is curved downwardly at 74 and bears against the lower surface of the damper 64 so that when the rod 68 and finger 72 are moved rearwardly, the curved surface at 74 will push the damper 64 upwardly, thus closing the opening 56. Conversely, pulling the rod 68 outwardly will move the finger 72 forwardly and permit the damper 64 to open. With this arrangement, the damper 64 will usually be closed but if, because of the prevailing weather conditions, the fire is not getting sufficient draft, the operator can supplement this draft by merely moving the knob 70 outwardly a desired amount.

From the above description of a preferred embodiment of our invention, it will be seen that we have provided a heater that satisfies all of the objectives set out in the earlier portion of this specification.

What we claim is new and useful and desire to secure by Letters Patent of the United States is:

1. In a room heater, conduit means having an opening at one end positioned at the upper portion of said heater and an exhaust end positioned adjacent the lower end of said heater, said exhaust end being so arranged that air flowing therefrom will pass substantially horizontally across the floor of a room to be heated, a branch conduit means having an opening adjacent the lower end of said heater and being connected at its opposite end to an intermediate point of said conduit means, blower means positioned in said conduit means for drawing air through said conduit means and through the branch conduit means, and means for heating the air passing through the conduit means at a position between the opening at the upper end of said conduit means and the connection between the conduit means and the branch conduit means.

2. In a room heater, a heat generating means, a manifold, a plurality of heat exchange pipes connected to said manifold, said pipes extending upwardly from said manifold and having openings at the upper portion of said heater, said heat generating means being adapted to heat said manifold and said heat exchange pipes, a pair of conduits connected to opposite ends of said manifold and extending downwardly therefrom, a blower, an electric motor for driving said blower, one of said conduits being connected to the inlet side of said blower, the other of said conduits having its open end positioned adjacent said blower motor so that cool air flowing into said opening will cool said motor, conduit means connected to the exhaust side of said blower and having its open end positioned adjacent the floor upon which said heater is supported, means directing air in the last said conduit to said heat generating means so that moving air can be supplied to said heat generating means to furnish a draft therefor, and manually operable means to regulate the amount of air diverted from the blower exhaust conduit for supplying a draft to said heat generating means.

3. A room heater or the like adapted to operate either by forced circulation or by convection circulation without the use of control dampers, said heater comprising a transversely extending manifold, upwardly extending heat exchange pipes connected at their lower ends to said manifold, combustion means for heating said manifold and said heat exchange pipes so that air within said pipes will normally tend to rise by convection, said pipes being open at their upper ends to the space to be heated, a downwardly extending pipe connected to said manifold, the last said pipe being open at its lower end so that normally when said manifold and heat exchange pipes are heated air will flow upwardly through said downwardly extending pipe to replace air flowing from said manifold and upwardly extending heat exchange pipe, a conduit connected to said manifold at a point remote from the connection between said manifold and said downwardly extending pipe, a blower, means for driving said blower, means connecting the inlet side of said blower to said conduit so that when said blower is operating air will be drawn downwardly from said manifold, air thus drawn downwardly being replaced by air flowing downwardly through said heat exchange pipes and upwardly through said downwardly extending pipe, and means connecting the outlet side of said blower to the space to be heated.

4. A room heater or the like adapted to operate either by forced circulation or by convection circulation without the use of control dampers, said heater comprising a blower, means for driving said blower, means for directing air issuing from the outlet side of said blower to the space to be heated, a heat exchanger, means for heating said heat exchanger externally, means for connecting the interior of said heat exchanger to the inlet side of said blower so that when said blower is operating air will flow from said heat exchanger to said blower and from said blower to the space to be heated, conduit means connecting the upper portion of said heat exchanger to the space to be heated, other conduit means connecting the lower portion of said heat exchanger to the space to be heated so that when said blower is deenergized air will flow through said heat exchanger by convection and whereby when said blower is operating said blower will overcome the convection effect and cause air to flow into said heat exchanger through both said conduit means.

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