March 1, 1938. D. R. BARD 2,109,876

WARM AIR FURNACE

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FIG. 1.

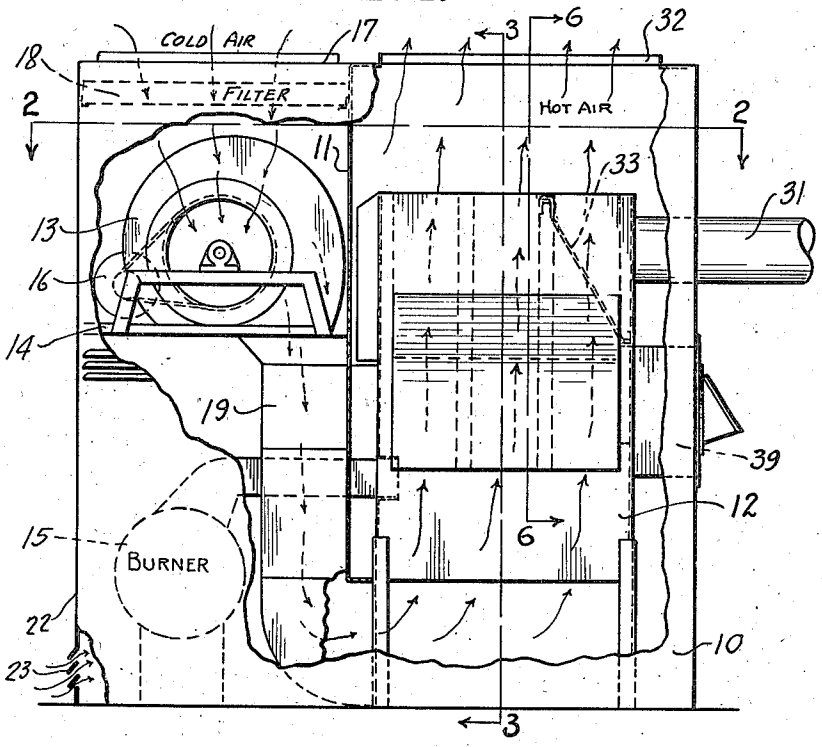
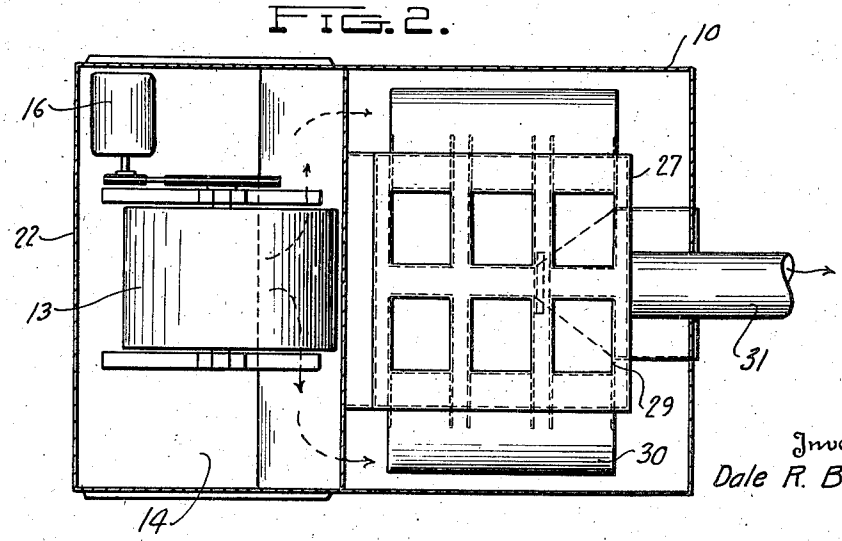


FIG. 2.



Inventor
Dale R. Bard

By Owen & Owen

Attorneys

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FIG. 3

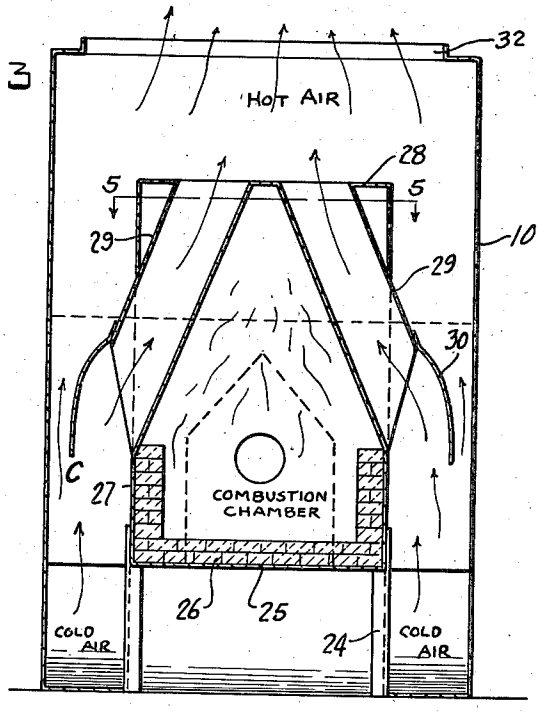


FIG. 4.

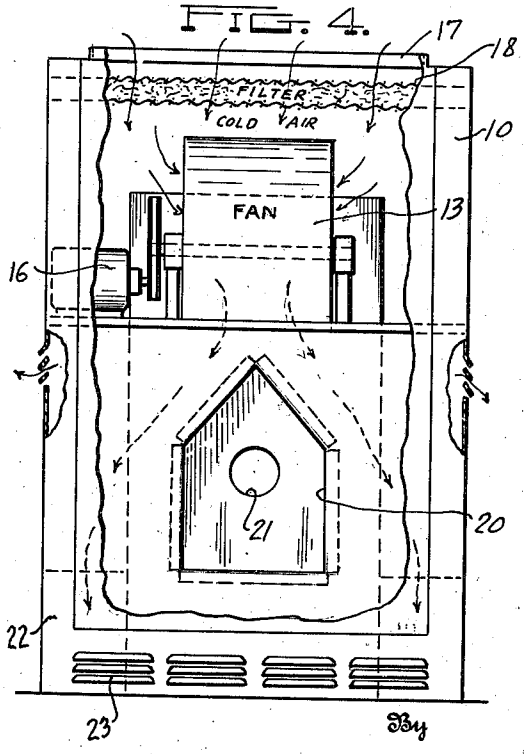
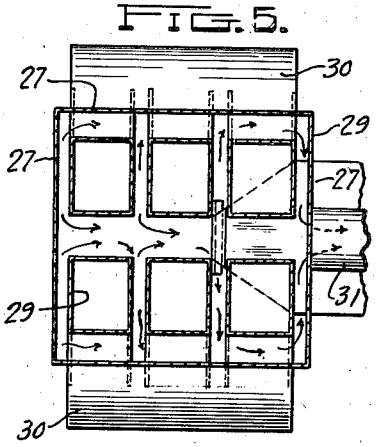


FIG. 5.



Inventor

Dale R. Bard

By Owen & Owen

Attorneys

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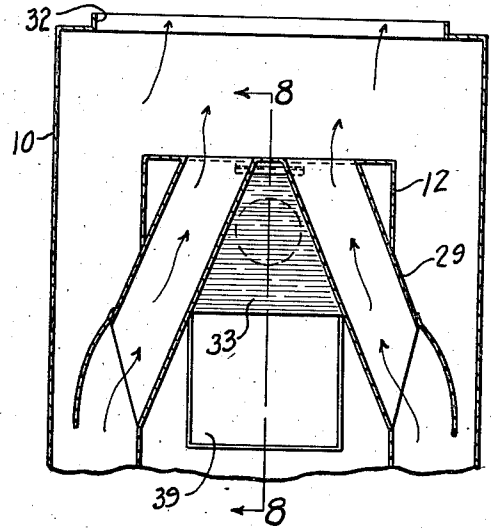
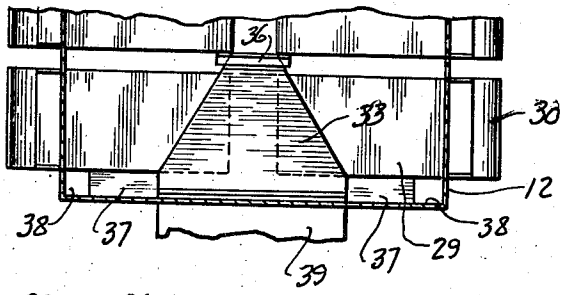


FIG. 6.

FIG. 7.



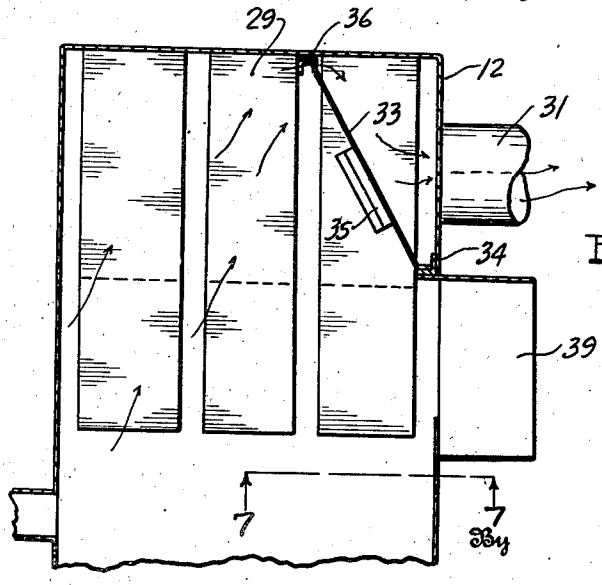


FIG. 8.

Inventor
Dale R. Bard

Owen & Owen

Attorneys

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UNITED STATES PATENT OFFICE

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WARM AIR FURNACE

Dale R. Bard, Bryan, Ohio

Application April 1, 1937, Serial No. 134,369

5 Claims. (Cl. 126—110)

This invention relates to warm air furnaces but more particularly to furnaces which employ mechanical heating devices such as oil burners for generating the heat and an object is to produce a new and improved furnace of this character which can be inexpensively manufactured, may be readily assembled, is compact in arrangement and efficiently heats a comparatively large volume of air.

Another object is to produce a warm air furnace in which the blower and heating device are arranged in superposed relation laterally of the radiator in a neat and compact manner at one end portion of the furnace, such that the air is forced by the blower into the lower end of the radiator and is heated during its upward travel.

Other objects and advantages of the invention will hereinafter appear and for purposes of illustration but not of limitation, an embodiment is shown on the accompanying drawings in which

Figure 1 is a side elevation of the furnace with a portion of the shell or outer casing broken away to show the construction and arrangement of the parts;

Fig. 2 is a transverse sectional elevation substantially on the line 2—2 of Fig. 1;

Fig. 3 is a vertical sectional elevation substantially on the line 3—3 of Fig. 1;

Fig. 4 is an end elevation of the furnace with some of the parts broken away to show the manner in which the oil burner is mounted and the manner in which the air stream is divided as it is forced into the radiator chamber;

Fig. 5 is a transverse sectional elevation taken through the upper end portion of the radiator structure showing by arrows the travel of the products of combustion;

Fig. 6 is a vertical sectional elevation substantially on the line 6—6 of Fig. 1 showing the baffle adjacent the smoke pipe;

Fig. 7 is a transverse section substantially on the line 7—7 of Fig. 8 looking upwardly into the inclined tubes and showing the baffle plate in position, and

Fig. 8 is an enlarged fragmentary vertical sectional view substantially on the line 8—8 of Fig. 6.

The illustrated embodiment of the invention comprises a warm air furnace having an outer casing or shell 10 which is of sheet metal and is rectangular in shape. The shell is divided into two compartments by means of a vertically disposed partition 11. In one compartment are disposed the combustion chamber and radiator 12 and in the other compartment are disposed a blower 13 which is supported on a horizontal platform 14, and directly therebeneath an oil burner 15. The blower 13, which preferably consists of a squirrel cage type fan driven by an electric motor 16, draws in cold air through an opening 17 in the top of the shell or casing 10 through filters 18 of glass wool or other suitable material and forces the stream of air into a downwardly disposed conduit 19 which is juxtaposed to the partition 11.

The conduit 19 is divided into two sections by means of a partition member 20 which extends from one side of the conduit to the other side. The front end of the partition 20 is opened and the rear end is closed except for an opening 21 through which the nozzle of the oil burner 15 extends; the opening 21 leading directly into the combustion chamber. As shown in Figure 1, the lower end of the conduit inclines rearwardly so that the air is directed into the lower end of the interior of the rear compartment. By dividing the air into the two streams, more efficient heating thereof is obtained. It will be apparent that due to the compact arrangement of the blower and burner, the size of the installation is materially reduced and the cost thereof is likewise reduced to a minimum.

The front end of the shell 10 is closed by a panel 22 having louvres 23 in the lower portion and this panel may be removed to afford access to the blower and burner structures. It will be understood that any suitable type of oil burner 15 of the pressure type may be employed.

Disposed in the rearward compartment of the casing 10 are the radiator and combustion chamber structures. As shown in Figure 3, legs 24 support a platform 25 on which the fire brick structure 26 is supported. Rising from the platform 25 are four side walls 27 of the radiator and to the upper ends of the walls is connected the top wall 28. Formed in opposed side walls 27 are a series of upwardly and inwardly inclined open-ended tubes 29 which are substantially rectangular or square in cross section. The upper ends of tubes 29, there being three on opposite sides, terminate close to each other, and as shown in Figure 3, incline toward each other. The lower portion of each of the tubes 29 extends outwardly beyond the adjacent side wall 27 and terminates diagonally with respect to the side walls.

Connected to the projecting lower portions of the tubes 29 and joined to each set of three tubes on that side is a deflector or baffle plate 30 which curves outwardly and downwardly, the lower portion thereof being substantially parallel to the

adjacent side wall of the shell 10 and being spaced a slight distance therefrom. This deflects the major portion of the air into the tubes 29 but allows some of the air to pass outside of the tubes and be heated by contact with the side walls 27 and associated parts. The heated air passes upwardly within the shell 10 and through an opening 32 from which may radiate the ducts leading to the various rooms in the building. In this manner, a simple and comparatively inexpensive structure is produced but one which efficiently imparts heat to a very large volume of air introduced to the rear compartment of the shell.

As shown in Figure 5, the tubes 29 on each side are spaced from each other and the outer tubes are spaced from the adjacent walls 27. This enables the products of combustion inside the radiator to pass upwardly within the combustion chamber C between the tubes and to contact with each side of the tubes over the major portion thereof. Extending rearwardly from the upper end of the combustion chamber housing is a pipe 31 which may lead to the usual smoke stack, providing an exhaust passage for the products of combustion. The arrows on Fig. 5 show the travel of the gases within the upper portion of the combustion chamber and indicate how the heating of the tubes is accomplished.

To insure that the heated gases or products of combustion do not pass directly to the smoke pipe 31, but to cause the same to more nearly follow the path indicated by the arrows on Fig. 5 so that the gases pass around the major area of the individual flues or tubes 29, a baffle plate 33, substantially triangular in shape fits in between the rearmost pair of tubes 29. The baffle plate 33 has its lower end resting against a bracket 34 and is provided with a combined handle and reinforcing piece 35 on its under side. The upper end of the baffle 33 bears against a bar 36 which is spaced a short distance beneath the top wall of the radiator. Since the baffle 33 is directly in front of the smoke pipe 31 and covers the space between the rearmost pair of tubes 29, the gases and other products of combustion must pass upwardly over the baffle plate 33 or in rear of the upper portions of the tubes 29 as will readily be apparent.

As best shown in Fig. 7, the space on each side of the lower end of the plate 33, adjacent the lower end thereof, is closed in any suitable manner by a filler piece 37 leaving a relatively small opening 38 at each end so that soot and the like will drop through the opening 38 into the combustion chamber. In use, the chamber, divided by the baffle plate 33 and the rear wall of the radiator 12, may receive soot, etc. and in order to clean out that pocket, the baffle plate 33 may be inclined upwardly and rearwardly and thus be removed, access being had thereto through the clean-out opening 39.

It is to be understood that numerous changes in details of construction, arrangement and operation may be effected without departing from the spirit of the invention especially as defined in the appended claims.

What I claim is:

1. A warm air furnace comprising a shell, a partition dividing said shell into inner and outer portions, a combustion housing within the inner portion of said shell, means providing a conduit leading from the upper to the lower portion of said shell for admitting cold air, a platform dividing said outer portion of said shell adjacent the conduit into upper and lower compartments, a blower in the upper compartment on said platform for forcing air into said conduit, an oil burner in the lower compartment, and means providing an opening for the oil burner nozzle through said conduit.

2. A warm air furnace comprising a shell, a partition dividing said shell into two chambers, a fuel burning device and a blower disposed in one chamber and arranged in vertically spaced relation one above the other, a cold air duct juxtaposed to said partition and leading downwardly from said blower to the lower portion of the second chamber, a radiator in said second chamber, and means in said duct for dividing the air stream and also affording connection of said fuel burning device with the interior of said radiator.

3. A warm air furnace, as claimed in claim 1, wherein the opening providing means is disposed in the conduit in such manner as to separate the air passing therethrough into a plurality of streams.

4. A warm air furnace, as claimed in claim 1, wherein the opening through the cold air conduit is bounded by inclined sides so disposed as to divide the air into two streams.

5. A warm air furnace comprising a shell, a partition dividing said shell into two chambers, a fuel burning device and a blower disposed in one chamber and arranged in vertically spaced relation one above the other, a platform for supporting said blower, a radiator in said second chamber, a cold air duct juxtaposed to said partition and leading from said blower to the lower end of said radiator, and means in said duct providing an opening to said radiator and sealed from the interior of said duct to enable a portion of said fuel burning device to extend into said radiator.

DALE R. BARD.