Dec. 9, 1941. C. J. WALTEMADE 2,265,501

WARM AIR FURNACE

Filed April 14, 1938 3 Sheets-Sheet 1

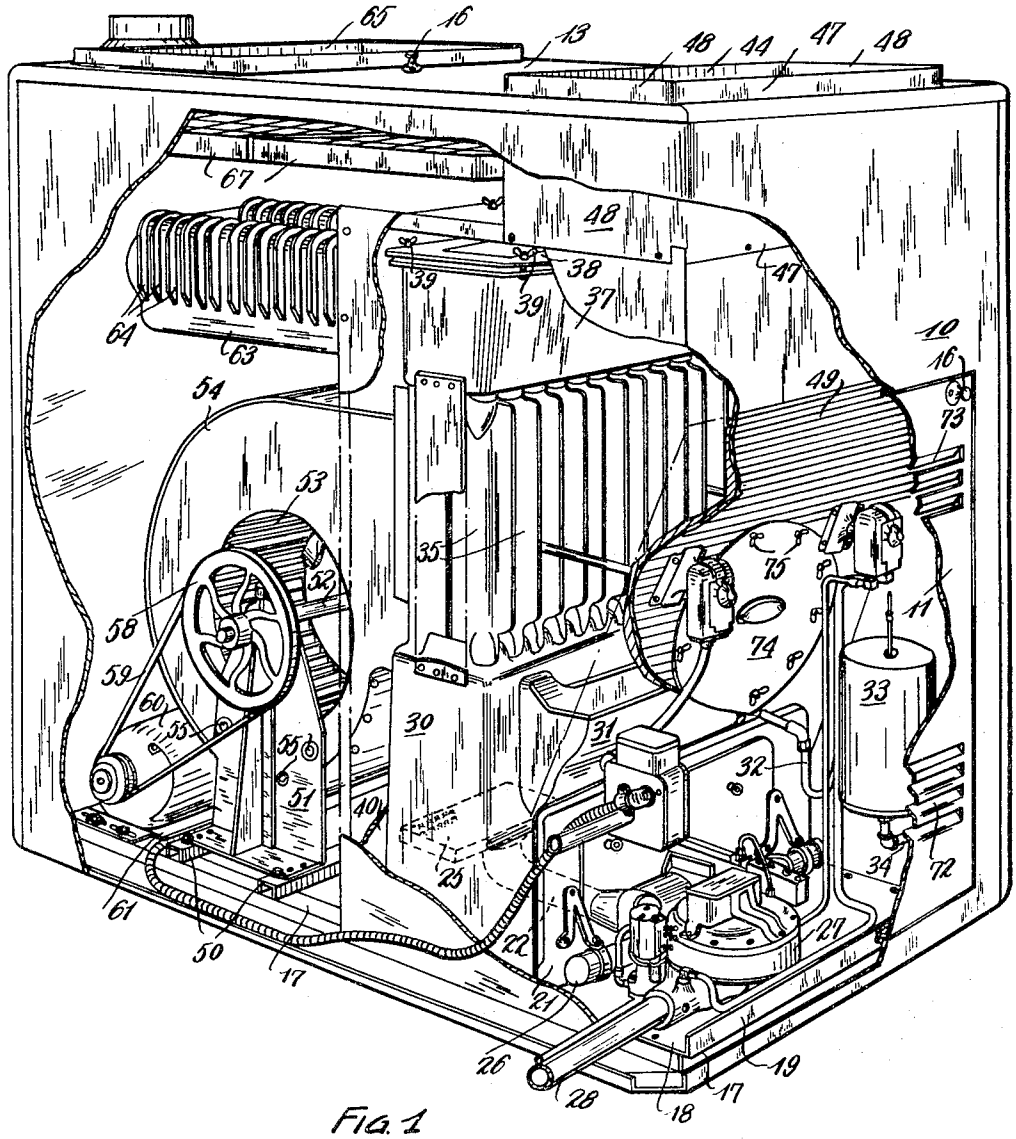


FIG. 1

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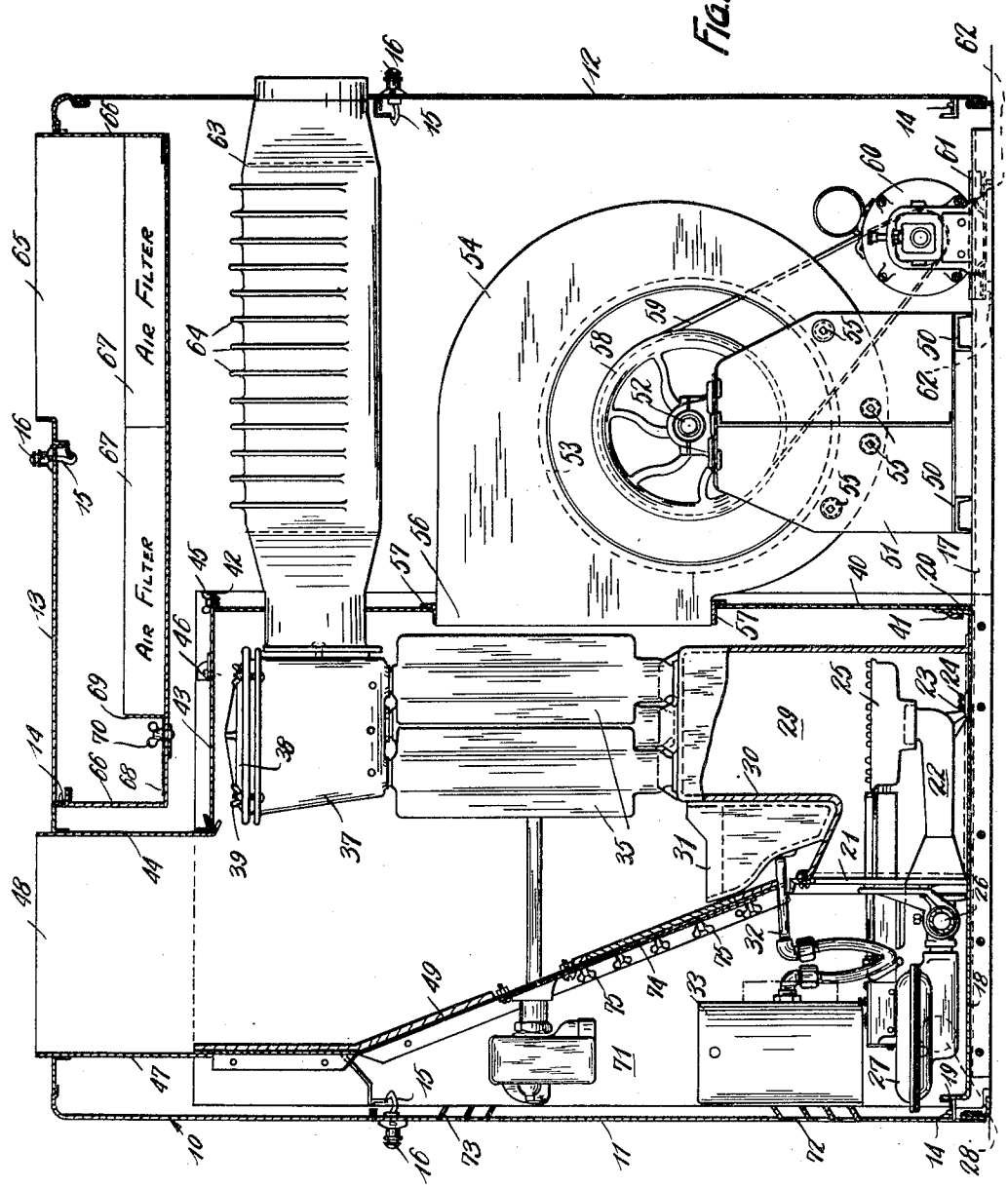
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Fig. 2



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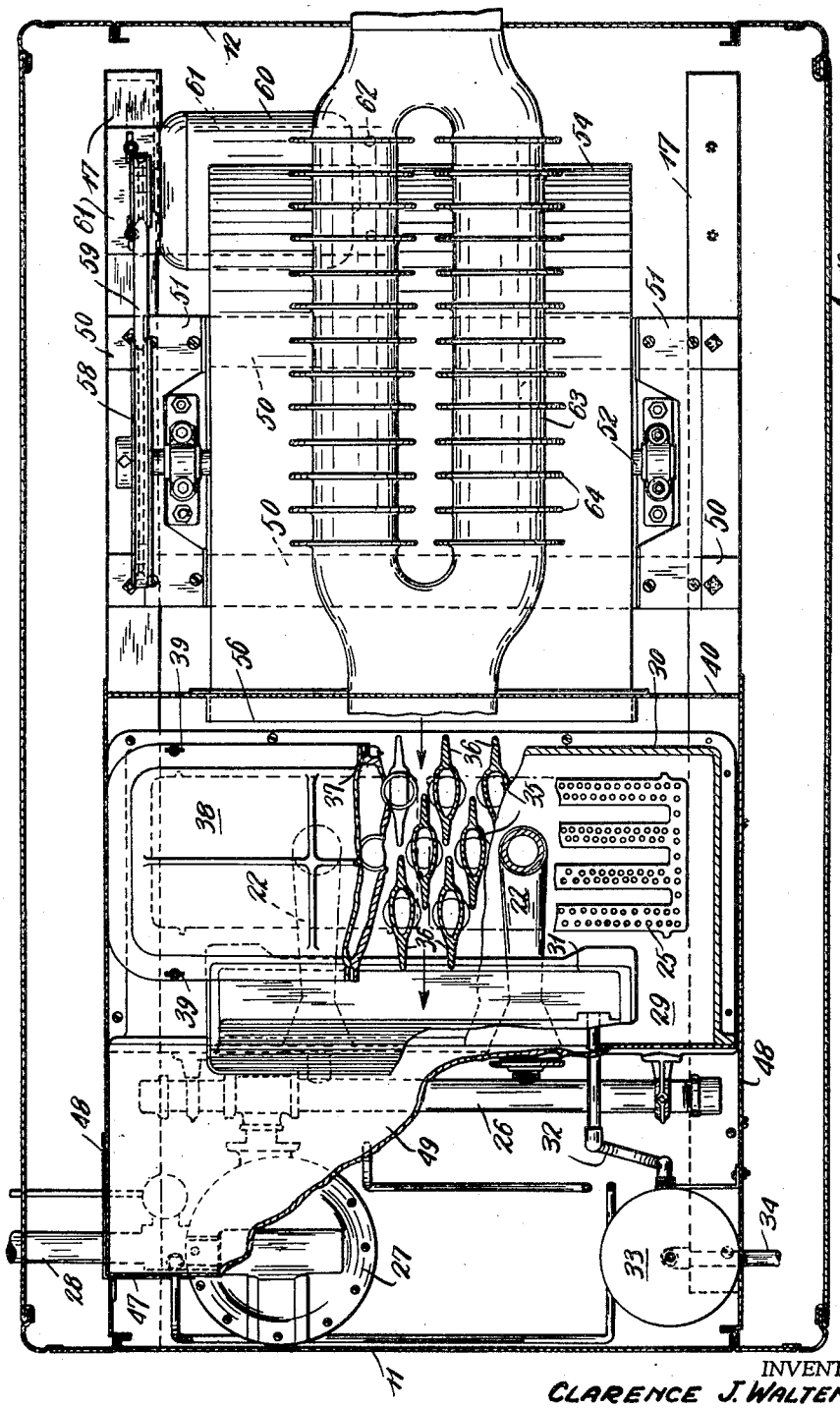


FIG. 3

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Patented Dec. 9, 1941

2,265,501

UNITED STATES PATENT OFFICE

2,265,501

WARM AIR FURNACE

Clarence J. Waltemade, Cleveland, Ohio, assignor to The Bryant Heater Company, Cleveland, Ohio, a corporation of Ohio

Application April 14, 1938, Serial No. 201,983

2 Claims. (Cl. 126—110)

This invention relates to improvements in warm air furnaces, particularly furnaces of that type equipped with means for cleaning and humidifying the air.

One of the objects of the invention is the provision of improved means for preventing the loss of heat from the furnace to the surrounding atmosphere.

Another object is the provision of means for utilizing heat remaining in the combustion gases after they have passed through the main heat exchanger, for the purpose of preheating the air entering the furnace.

Still another object is the provision of a rigid base for the various elements of the apparatus to which they may be secured and by which they may be maintained in correct relation to each other regardless of the character of the floor upon which the furnace is installed.

Other objects and features of novelty will be apparent as I proceed with the description of that embodiment of the invention which, for the purposes of the present application, I have illustrated in the accompanying drawings, in which

Fig. 1 is a perspective view of a furnace embodying the invention, portions being broken away in order to more clearly illustrate the apparatus.

Fig. 2 is a side elevational view, partly in vertical section, and

Fig. 3 is a plan view with parts broken away and other parts in horizontal section.

In the drawings I have illustrated a warm air furnace having an outer casing 10 which encloses completely the operating parts and the controls. In this casing there is a removable front panel 11 by means of which access is gained to the control apparatus and the burners, a removable rear panel 12 through which access may be had to the blower, and a top panel 13 which may be removed to afford access to the air filter screens and also to provide an air intake from the furnace room for summer air conditioning. These panels may be mounted at one end upon pins 14 and may be retained at the other end in each instance by a spring fastening 15 adapted to be released by depressing a push button 16.

A rigid base for the various elements of the apparatus is provided by a pair of inverted channels 17 or other structural bars which extend parallel to each other from front to rear of the apparatus. Attached to the forward portions of these channels there is a sheet metal plate 18 of heavy gauge with front and rear upstanding flanges 19 and 20. About half-way between the ends of plate 18 a vertical partition 21 is supported on the plate and extends crosswise of the furnace. Burner pipes 22 extend through suitable openings in the partition 21 and are supported at their inner ends by feet 23 which are removably fastened to the plate 18 by bolts and wing nuts 24, shown in Fig. 2. The burners 25 are removably supported on the inner ends of these pipes. The pipes 22 are connected to a manifold 26 carried by brackets attached to the partition 21, and this manifold communicates with a main gas valve 27 which, preferably, is adapted for automatic control. The main gas line is illustrated at 28. Gas is the fuel preferred, and the drawings illustrate equipment for burning gas, but it should be understood that in some of its aspects the invention is applicable to furnaces employing other fuels.

Behind the partition 21 there is a combustion chamber 29 enclosed by a casting 30 for which the partition 21 constitutes a front closure. In a pocket provided at the front of the casting I mount a humidifying pan 31 formed preferably of cast iron and having wall surfaces in contact with wall surfaces of the casting 30 to provide for good conduction of heat to the pan. Suitable means may be provided for maintaining a constant level of water in the pan 31, as through a pipe 32 connected with a small water tank 33. Water enters the tank 33 through a service pipe 34. A valve in this pipe controlled by a float in tank 33 maintains a desired level in the tank, and the same level is maintained in the pan 31 by virtue of the connection between the tank and the pan. The float controlled valve is not illustrated herein inasmuch as the valve, per se, forms no part of the present invention.

A bank of tubular flues 35 extend upwardly from the top of hollow casting 30. These tubular flues are arranged in rows, the flues of one row being staggered with respect to those of the adjacent row or rows, as clearly indicated in Fig. 3. The tubular portions of these flues have a stream line cross section, as also indicated in Fig. 3, except for the end portions which are cylindrical in order to facilitate fitting them into the connecting parts. Forward and rearward fins 36 arranged parallel with the direction of flow of the air are formed as integral parts of the flues. This construction and arrangement of flues presents a minimum of resistance to the passage of air through the bank while at the same time causing a maximum scouring action and high efficiency.

At the upper ends of the bank of flues 35 there

is a header box 37 to which the flues are secured and with which they communicate. The header box 37 has a readily removable cover 38 which is locked down by wing nuts 39 on bolts or studs fixed in an outturned flange at the top of the header.

Within the casing and to the rear of the casing 30, bank of tubes 35 and header 37, there is a transverse partition 40 which stands directly adjacent the flange 20 on base plate 18 and is held in contact therewith by a Z-bar 41 welded to the partition. At its upper end the partition 40 has a flange 42 which forms a support for one edge of a removable plate 43, the opposite edge of which extends into a V-shaped space formed by two divergent flanges on an upright plate 44 that forms one side of the warm air outlet of the furnace. Bolts with wing nuts 45 removably hold the plate 43 in position. When these bolts are removed the plate may be slid backward to fully expose the cover 38 of the header box 37, a finger hold 46 being provided to assist in the handling of the plate.

The other sides of the warm air outlet are formed by a front plate 47 and side plates 48, the side plates extending all the way down to the base plate 18 and back to the partition 40. Front plate 47 is connected with partition 21 by a plate 49, a portion of which is inclined downwardly and rearwardly.

The space enclosed by side walls 48, rear wall 40, front wall 49 and plate 43 constitutes a separate air heating compartment within the outer casing 10. This compartment is under a slight pressure during the operation of the blower, and is made as nearly air-tight as possible under ordinary manufacturing conditions.

To the rear of partition 40 a pair of inverted channels 50 are fastened to the main base channel 17. Near their ends these transverse channels support brackets 51 which may be built up of heavy gauge sheet metal. They carry bearings for a shaft 52 upon which is mounted the rotor 53 of a blower. The hollow shell 54 of the blower is supported chiefly by the brackets 51 through the intermediancy of fastenings 55. The rectangular mouth 56 of the blower extends through an opening in the partition 40, packing 57 being used to make an air-tight joint. The blower therefore delivers air into the forward compartment directly to the rear of the bank of flues, thereby causing air to flow through the bank as indicated by arrows in Fig. 3.

The shaft 52 carries at one end a pulley 58 over which runs a belt 59 that is driven by an electric motor 60. The motor is attached to a plate 61 which is adjustably bolted to one of the base channels 17. The opposite end of plate 61 is provided with rubber feet 62 that may rest on the floor which supports the furnace. This provides a resilient motor support and deadens the noise of operation.

An economizer flue 63 is bolted to header box 37 around an opening in the rear side of the box. This flue extends through suitable openings in partition 40 and outer casing 10, by which it is partially supported. Exteriorly of the casing a connection is made with the smoke pipe, not shown. This economizer flue is preferably round at its ends, but intermediate its ends it is divided into two branches, each of which in cross section is relatively long in the vertical direction and short in the horizontal direction, so that return air from the rooms being heated or fresh air from outside of the house, will have a relatively long travel over the two branches. In order to increase the radiation, these branches are formed with vertical fins 64.

In the top of the furnace at the rear end thereof there is a return air or cold air connection 65 through which air enters and flows down over the economizer flue 63 and into the blower 53, 54. A supporting frame 66 depending from the top of the casing and provided with inturned flanges at the bottom serves as a support for a pair of filter screens 67, the filtering material being preferably matted glass threads. The frame 66 is somewhat larger than necessary to accommodate the two air filters, but the remaining space, which may vary to a slight extent owing to variations in the dimensions of the screens, is taken up by an adjustable plate 68 which has a vertical flange 69 for engagement with the adjacent filter screen. This plate may also be removed entirely after first removing thumb screws 70 by which the plate is held in place.

When it is desired to clean the vertical flues 35 the panel 13 of the casing is removed, the plate 68 and the adjacent filter screen 67 are removed, then the panel 43 is taken out or slid back out of the way, and the cover 38 is unfastened and lifted out. Then, as will be obvious, a flue cleaning brush may be directed downwardly into the flues 35 one after another, and the soot and dirt pushed down into the combustion chamber 29. However, before this is done, the burners 25 and pipes 22 should be removed, so that the material forced out of the flues will fall upon the plate 18 from whence it may be brushed forward through openings in the partition 21. These provisions permitting quick and easy cleaning of the flues and burner parts constitute an important feature of my invention.

It will be noted that all of the controls are mounted at the front of the furnace in a section or chamber 71 which is relatively cool, the panel 49 being lined with asbestos or other heat insulating material. This section of the furnace is furthermore ventilated by a set of louvres 72 at the bottom of panel 11 and a further set 73 near the top thereof. All of the control instruments are therefore maintained relatively cool.

In the panel 49 opposite the humidifying pan 31 there is an opening through which access may be gained to the pan for inspection, cleaning or the like, this opening being covered normally by an insulation lined plate 74 that is held in place by bolts and wing nuts 75.

In the summertime, when it is desired to air-condition the premises, the cool air in the basement in which the furnace is installed may be taken into the casing by removing the panel 18 in the top thereof, and thus cool and filtered air may be forced by the blower up through the air conduits of the furnace into the rooms to be conditioned. This provision for filtering either return air or basement air, as may be desired, is another important feature of the invention.

Having thus described my invention, I claim:

1. In a warm air furnace, a casing, a heat exchanger comprising vertical flues and a horizontal header with a removable top, said header being mounted at the upper ends of the flues, a compartment in the top of the casing above said header, a removable air filter screen separating said compartment from the remaining space within the casing, said compartment having a return air opening in the top thereof, said compartment also having a second opening in

the top thereof above said header through which access may be had to the filter screen and to the header after removal of the screen, and a removable and replaceable closure for said second opening, whereby the removal of said closure permits the introduction of surrounding air into the furnace and permits the cleaning of the flues through said header.

2. In a warm air furnace, a casing, a burner, a heat exchange compartment within said casing having an upwardly extending outlet for heated air, said compartment to one side of said outlet having a removable horizontal panel spaced from the top of the casing, a bank of tubular flues in said compartment through which the products of combustion from said burner are caused to pass, a header box superposed upon the upper ends of said tubular flues within said compartment below said removable panel, a removable cover for said header box, and said casing having a removable panel above said first named panel, whereby a flue cleaner may be inserted into the vertical flues through the openings provided by the removal of said panels and said cover.

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