Sept. 11, 1934. R. B. RAINEY 1,973,016

HOT AIR FURNACE

Filed June 17, 1933 2 Sheets-Sheet 1

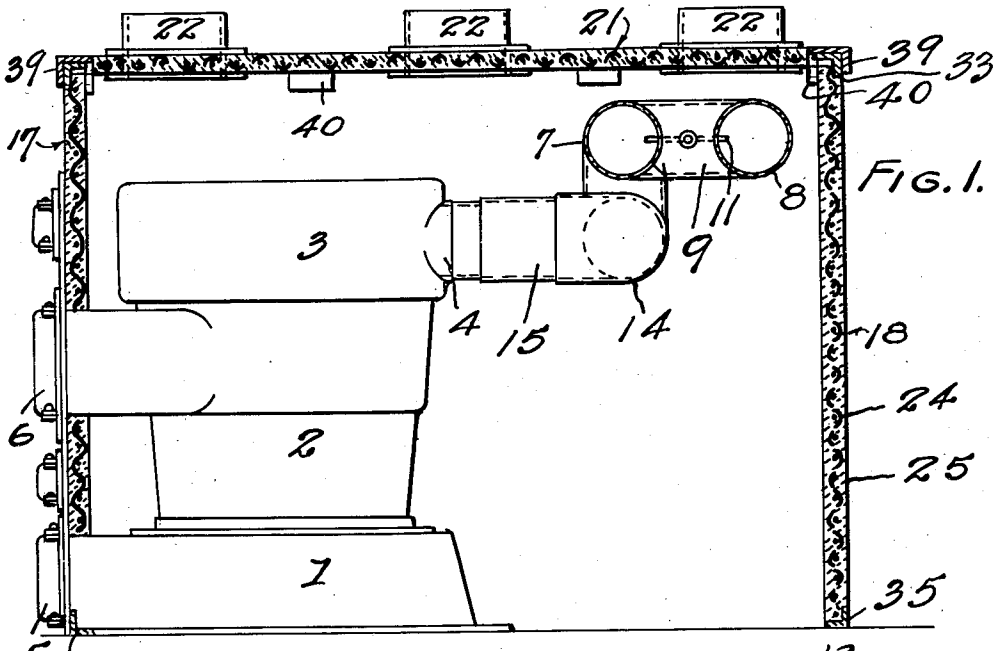

FIG. 1.

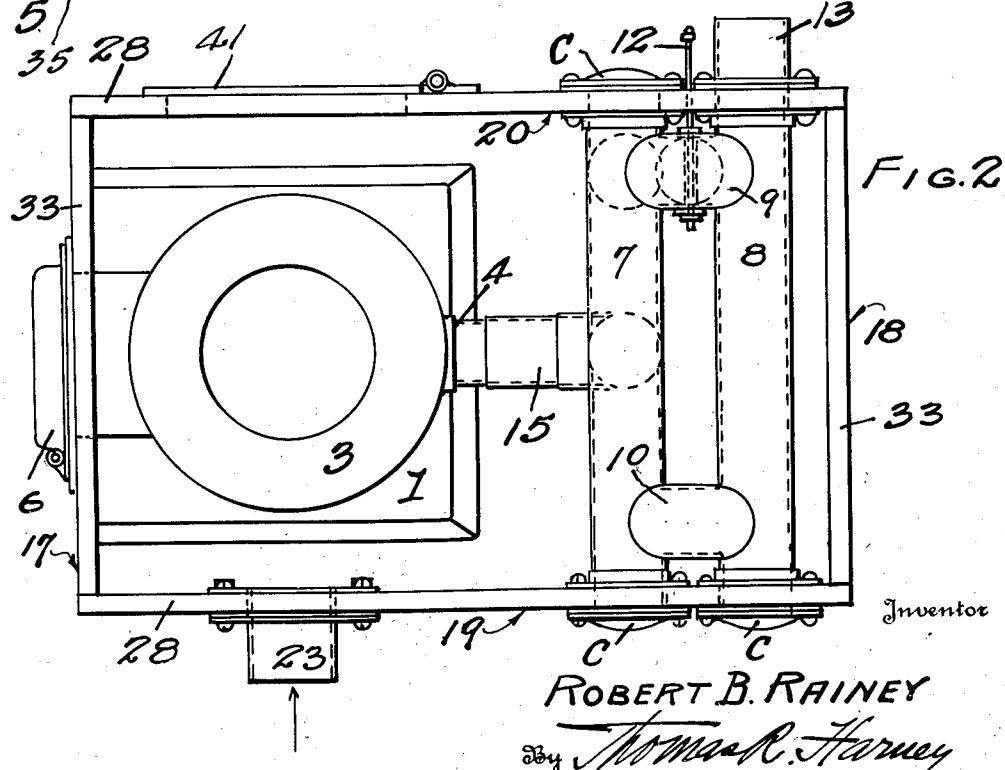

FIG. 2.

Inventor

ROBERT B. RAINEY

By Thomas R. Harney

Attorney

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FIG. 3.

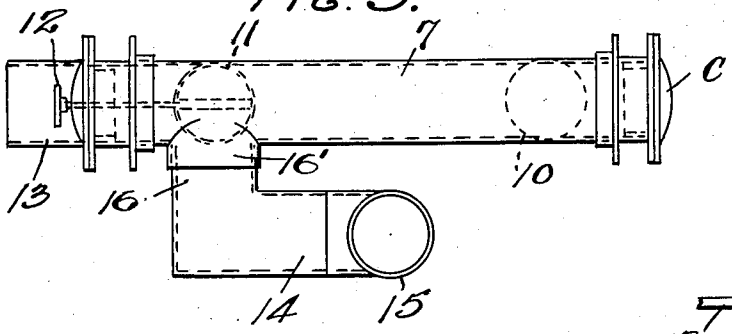
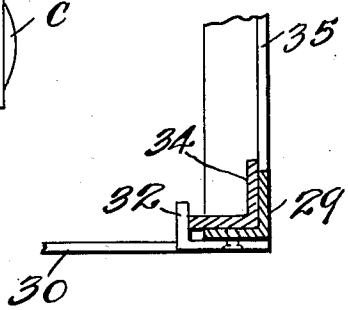


FIG. 6.



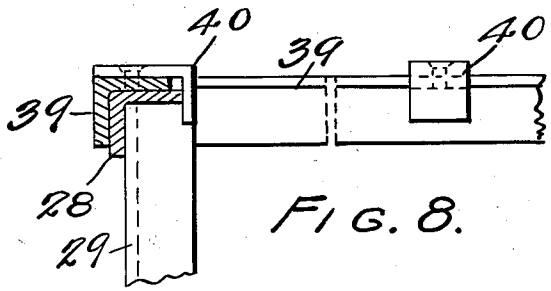


FIG. 8.

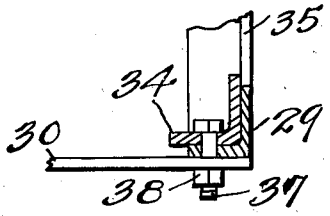


FIG. 7.

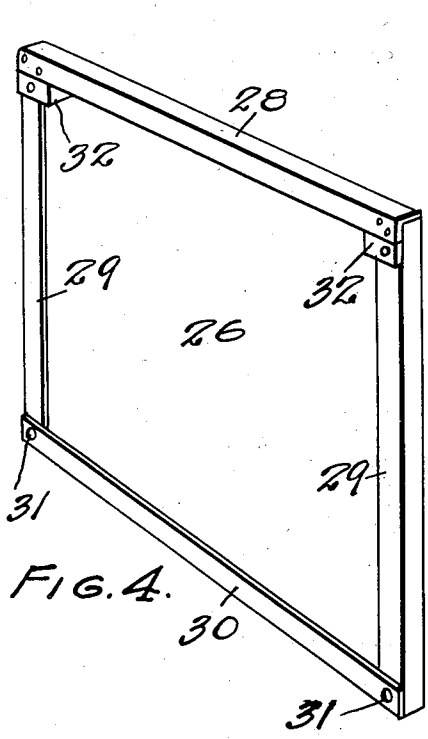


FIG. 4.

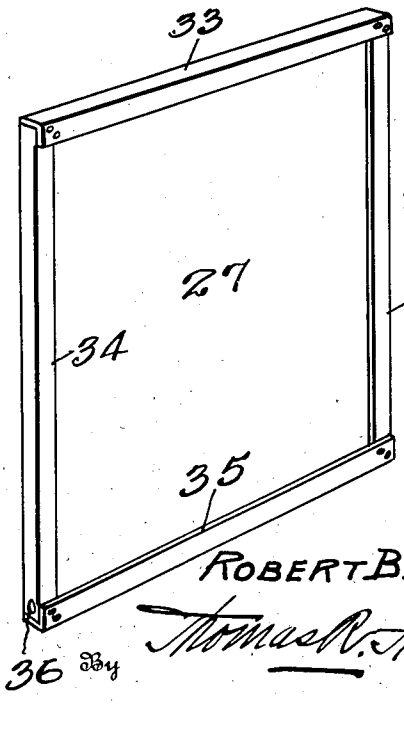


FIG. 5.

Inventor

ROBERT B. RAINEY.

By Thomas R. Harney

Attorney

Patented Sept. 11, 1934

1,973,016

UNITED STATES PATENT OFFICE

1,973,016

HOT AIR FURNACE

Robert B. Rainey, Washington, D. C.

Application June 17, 1933, Serial No. 676,384

4 Claims. (Cl. 126—114)

My present invention relates to improvements in hot air furnaces or heating systems for domestic and other uses, and the invention contemplates the employment of an auxiliary radiator, and enclosing casing or jacket for the furnace and radiator.

In carrying out my invention I utilize any suitable type of hot-air furnace, and I attach the auxiliary radiator, which is of novel but simple construction, to the smoke outlet from the furnace, and the furnace and auxiliary radiator are enclosed within a casing or jacket forming a hot air chamber. The enclosing jacket or casing is provided with a removable top, and with removable side walls in order that access may be had with facility to the interior of the casing and to the furnace and radiator for repairs, adjustments, and for cleaning purposes.

The auxiliary radiator through which the smoke from the furnace is conducted is provided with a damper to provide for either a direct draft or an indirect draft from the furnace to the chimney or smoke pipe, and the radiator is located in the upper part of the heating chamber that surrounds the furnace.

The walls forming the casing or jacket of the heating chamber are fashioned of porous, heat-insulating material, which material is pervious to air, and the heating chamber, in addition to the usual cold-air duct leading thereto, is thus adapted to receive air from the atmosphere, this movement of the air through the walls of the casing taking place through induction caused by the flow of hot air from the heating chamber when the furnace is in operation.

The hot air is conveyed from the heating chamber, or the interior of the casing, through the usual hot air ducts, and released in the various rooms of a house through the usual registers or other outlets.

It will be understood that the casing or jacket may be varied in size and in shape for the purpose of adapting it to various types of furnaces, and the casing and auxiliary radiator may be located in different positions with relation to the furnace, thus accommodating the equipment of my invention to conditions in the cellar or basement in which the apparatus is utilized, and also accommodating the apparatus to objects surrounding the furnace.

The auxiliary radiator as well as the casing or jacket may be constructed in standard sizes and shapes for use with complementary furnaces, or my equipment may be applied to furnaces now in use by first displacing the usual heating drum or outer casing of the furnace, and substituting therefor my enclosing casing or jacket together with the auxiliary radiator.

The invention consists in certain novel combinations and arrangements of parts as will hereinafter be more fully set forth and claimed. In the accompanying drawings I have illustrated one complete example of the physical embodiment of my invention wherein the parts are combined and arranged according to one mode I have thus far devised for the practical application of the principles of my invention, but it will be understood that various changes and alterations may be made in the exemplified structure within the scope of my appended claims, without departing from the principles of my invention.

Figure 1 is a view with the jacket or casing in vertical section, and showing the relation of the furnace and auxiliary radiator within the casing, the radiator also being shown in section.

Figure 2 is a top plan view of the apparatus, with the top of the casing removed for convenience of illustration.

Figure 3 is a view showing the auxiliary radiator in elevation and detached.

Figure 4 is a perspective view of one of the frames of the two removable side walls of the casing, and Figure 5 is a similar view of one of the end walls of the casing.

Figure 6 is an enlarged sectional detail view near the top of the casing, at a corner, showing the manner of securing the upper part of the removable side wall to an end of the casing.

Figure 7 is a similar view at the bottom corner of the casing showing the manner of bolting the removable side wall to the end wall of the casing.

Figure 8 is a detail sectional view at one corner of the casing, showing the manner in which the removable top of the casing is retained at the upper edges of the vertical walls of the casing.

In order that the general arrangement and relation of parts may readily be understood I have illustrated in Figures 1 and 2 a well known type of hot air furnace having the usual ash-pit 1, the fire pot 2 and heating drum 3, the latter being provided with a smoke outlet 4 at its rear. The usual ash door 5 and coal door 6 are indicated at the front of the furnace, and other accessories of the furnace are of course employed, although not illustrated.

I preferably locate the auxiliary radiator at the rear of the furnace in a slightly elevated position with relation to the furnace, and the auxiliary radiator, which is horizontally disposed transversely of the furnace comprises one or more

units, of which each unit includes two parallel flues 7 and 8, spaced apart and joined near their ends by cross flues 9 and 10. These flues are preferably of thin sheet metal, and while I have shown them as of cylindrical shape, it will be understood that other shapes may be given to the flues, in cross section. One of the cross flues, as 9 is provided with a circular damper 11 of well known type, and the pivot rod 12, which extends outside the casing and is journaled in the walls of the cross flue 9, may be turned to cause a direct flow of smoke from the furnace to the chimney, as when the furnace is being fired, or when the fire is being started in the furnace. The damper 11 may also be turned to close, or substantially close, the cross flue 9, and thereby cause the smoke to pass indirectly to the chimney through the flue 7, cross flue 10, and the second flue 8, thence through the thimble 13 to which the smoke-pipe or chimney pipe is connected.

The four ends of the parallel flues 7 and 8 are each available for use by attaching the thimble 13 to the desired end of a flue, and the remaining three ends of the flues are closed by removable caps C, C, C, that are firmly secured to the flues. These caps may readily be removed when it is necessary or desirable to clean out the flues, and a brush or scraper, or other tool, may be inserted through an open end of a flue for the purpose of removing accumulated soot and ash-dust.

One of the flues, as 7, is connected to the smoke outlet 4 of the furnace by a double elbow section 14, located beneath the flue 7, and connected to the smoke outlet 4 by the connection 15, and to the flue by connection 16, a flange 16' being provided at the underside of the flue for the telescopic connection of these parts. The connections of this lower section of the auxiliary radiator, that is, the double elbow, are of the usual telescopic type, and it will be apparent that the lower section 14 may be adjusted in manner usual for smoke pipes. Thus, if conditions require, the auxiliary radiator may be turned around so that the thimble 13 will be at the lower end of Figure 2, as will also the cross flue 9, and the lower section 14 of the radiator may also be turned on its swivel joints 15 and 16, and of course the thimble 13 may be removed from the end of flue 8 and placed at the other end of that flue, or at either end of flue 7. Because of this simplicity in construction of the auxiliary radiator, it may readily be adapted to varying conditions, to insure most efficient disposition of the gases of combustion, and to utilize the heat from these gases in the hot-air or heating system.

The four ends of the two flues 7 and 8 are supported in the side walls of the casing or jacket that surrounds the furnace and the auxiliary radiator, and these walls are designated as units as front wall 17, rear wall 18, and removable side walls 19 and 20. The end walls and the side walls are joined together, as will be described, and a removable top, indicated as a whole by the number 21, fits over the top edges of the upright walls, all as indicated in Figure 1, to retain the walls, and to close the hot air chamber.

The removable top of the casing is provided with a number of thimbles 22 properly secured therein and adapted to support the hot-air ducts or flues that are fitted over the thimbles, and of course the hot air rises from the top portion of the hot air chamber through these outlets to the heating system of the house.

A cold air duct is connected to a thimble 23, located near the bottom of the casing and extended through one of the side walls, and this connection 23 is preferably located near the furnace in order that the cold air may circulate around the exterior of the furnace. The cold air duct that leads to the thimble 23 I preferably connect with an intake that is set in the floor of a room, or in the side wall of a room at the bottom of a stairway, in order that the cold air may be drawn to the furnace from the various parts of a dwelling, while the warm air is being conveyed to these rooms from the furnace, through the warm air ducts from the thimbles 22.

In addition to the supply of cold air at the intake 23, air from the atmosphere surrounding the casing is drawn through the walls of the casing due to the construction of these walls. Thus I employ a wire mesh or screen 24 upon which is built a porous layer or body 25 of appropriate thickness. The composite wall is built up from plastic asbestos, which is not only a heat insulating material, but is also porous, and when dried, is comparatively light in weight. While I have indicated the screen or reinforcing-base as of reticulated metal, it will be understood that any perforated material suitable for a base may be employed, and any other heat-insulating material that is pervious to air may be built upon the reticulated base.

The use of the material, as asbestos, in the composite wall, that is pervious to air, provides a wall through which air from the cellar or basement may be drawn to the heating chamber within the casing and surrounding the furnace and radiator. In its passage through the composite wall, the air is filtered or cleansed of dust and the dust from the cellar or basement is prevented from reaching the heated rooms of a dwelling. The exterior faces of the composite walls should be cleansed at suitable intervals, to remove dust accumulated from the atmosphere, and thus maintain the efficiency of the composite walls in admitting air to the heating chamber.

The composite, porous, heat insulated walls are fashioned on frames, one of the side-wall frames being indicated as 26 in Figure 4, and one of the end-wall frames being indicated as 27 in Figure 5, and the screens 24 are attached to or supported in these frames in any suitable manner to receive the porous covering 25.

Each side frame comprises a top angle iron 28, two angle iron posts 29, 29, and a bottom strap of metal 30, and as indicated in Figure 4 bolt holes 31 are provided in the frame 26 at its lower corners. Near the upper corners of this frame are fastened a pair of angle lugs 32 that are attached at the outer sides of the posts 29, and these lugs project inwardly of the casing, beneath the angle irons 28.

The end frames 27 each comprise an upper angle bar 33, two upright posts 34, 34, and an angle iron 35 at the bottom, these four parts being rigidly secured together in suitable manner. Each of the four posts 34, on their side faces, are provided with bolt holes 36 that register with the bolt holes 31 of the side frames.

The angle iron bars 28, 29, 29 of the side frame are adapted to fit over the side edges of the two end frames, the two lugs 32, 32 of the side frame sliding in frictional contact with the inner, side edges of the posts 34 of the ends. After the side frame has been thus applied to the two end frames, bolts 37 are passed through the registering holes 36 and 31, and the nuts 37 are then applied to the bolts, and screwed home for the purpose of rigidly connecting the four walls of

the casing around the bottom. The lugs 32, which pass through slots or holes, not shown, in the composite walls, fit snugly against the posts 34 of the ends of the casing, and by their frictional engagement therewith retain the walls in proper position. These slots or holes in the composite walls, are closed, by plastering around the lugs after the furnace is set up, and of course the slots or holes do not show in the completed furnace.

The top of the casing is also of composite material, if desired, and this top wall fits over the top edges of the four upright walls of the casing to retain the structure in rigid position. The casing-top is fashioned with a rectangular frame made up of angle iron bars 29 that are complementary to and fit over the top bars 28, 28 of the side frames, and the top bars 33, 33, of the end frames, as indicated in Figures 1 and 8, and to further brace the structure, the rectangular frame 39 is also provided with angle braces or lugs 40 secured to the frame and projecting downwardly to frictionally engage the inner edges of the top flanges of the bars 33 and 28. Thus it will be apparent that the casing walls are rigidly bolted together at their lower edges, and they are rigidly retained at their upper edges by means of the top-frame 39 and the retaining lugs 40 of this top frame.

The casing may thus readily be assembled about the furnace and the auxiliary radiator, and if desired, as for cleaning the interior of the hot air chamber, the top may be lifted, and then one of the side walls may be removed to give access to the interior of the casing. At 41 in Figure 2 a side door 41 is indicated as hinged in the wall 20 of the casing, which may be utilized in some instances to gain access to the interior of the casing.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination in a heating apparatus, with a furnace, of an enclosing casing comprising a composite filter-structure of heat-insulating material that is pervious to air, said casing having separable end walls, separable side walls for the casing and means for attaching the side walls to the end walls, a removable top, and coacting means on the top wall and the vertical walls for guiding the top wall to position and for retaining the side walls and end walls in upright position.

2. In a heating apparatus, the combination in an enclosing casing having separable end walls, of separable side walls having angle iron top bars and end posts fitted over the edges of the end walls, bolts and nuts securing said side walls to the end walls at the lower edges of the side walls, retaining lugs mounted on the side walls and engaging the end walls, a removable top for the casing, exterior flanges on said top fitted over the top edges of the upright walls, and depending guide lugs mounted on the top engaging the inner edges at the tops of the upright walls.

3. The combination in a heating apparatus, with a furnace, of an enclosing casing for the furnace having hot-air outlets, said casing comprising a filter-structure of heat-insulating material that is pervious to air, whereby the supply of air to be heated passes through the filter-structure to the interior of the casing.

4. The combination in a heating apparatus, with a furnace, of an enclosing casing for the furnace comprising a filter-structure of heat-insulating material that is pervious to air, said casing having separable walls, fastening means for the walls, and a top for the casing having hot-air outlets.

ROBERT B. RAINEY.