

Aug. 8, 1944.

E. M. ZIER, JR

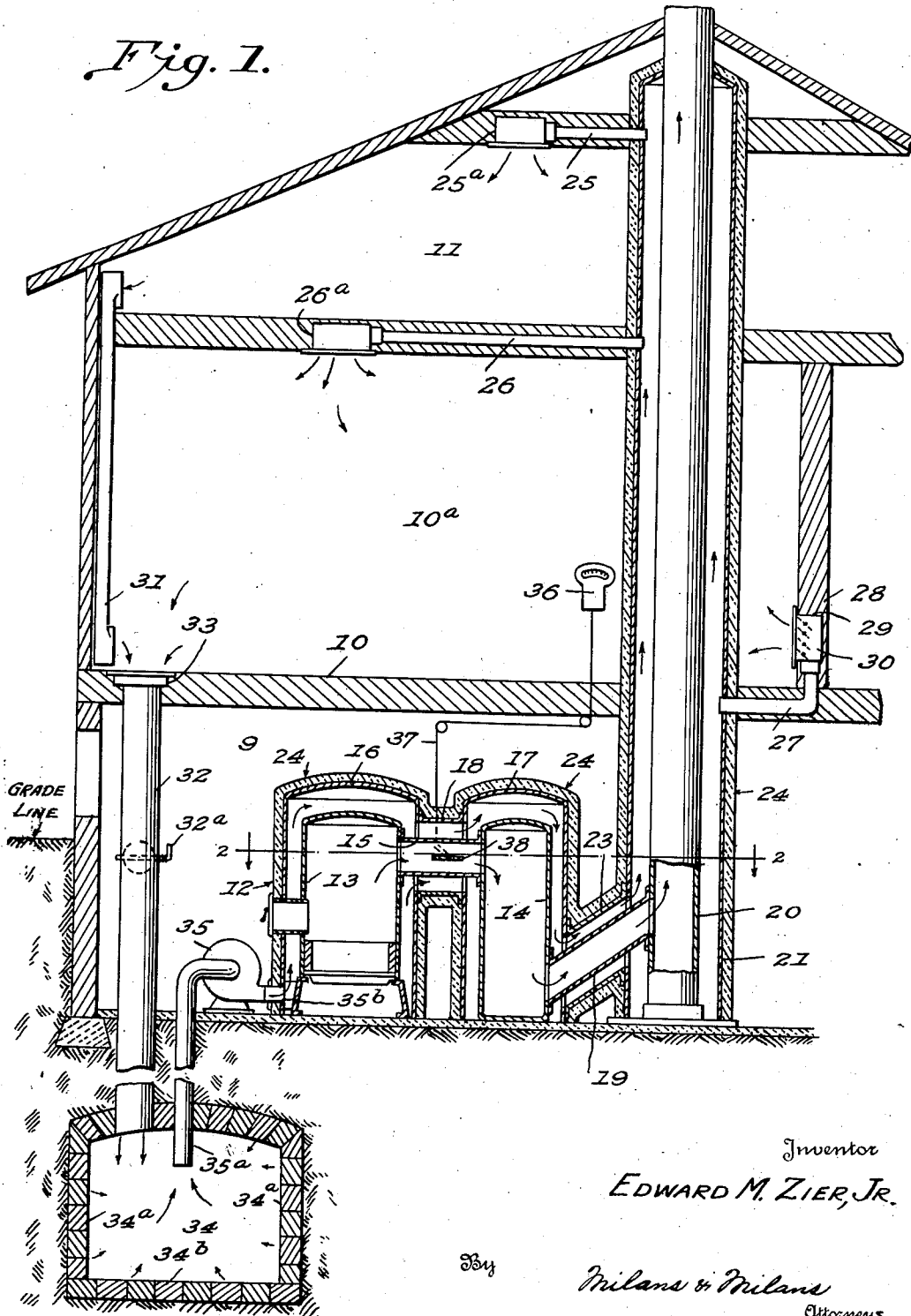
2,355,495

HEATING AND AIR CONDITIONING SYSTEM

Filed June 11, 1942

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Fig. 1.



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Fig. 2.

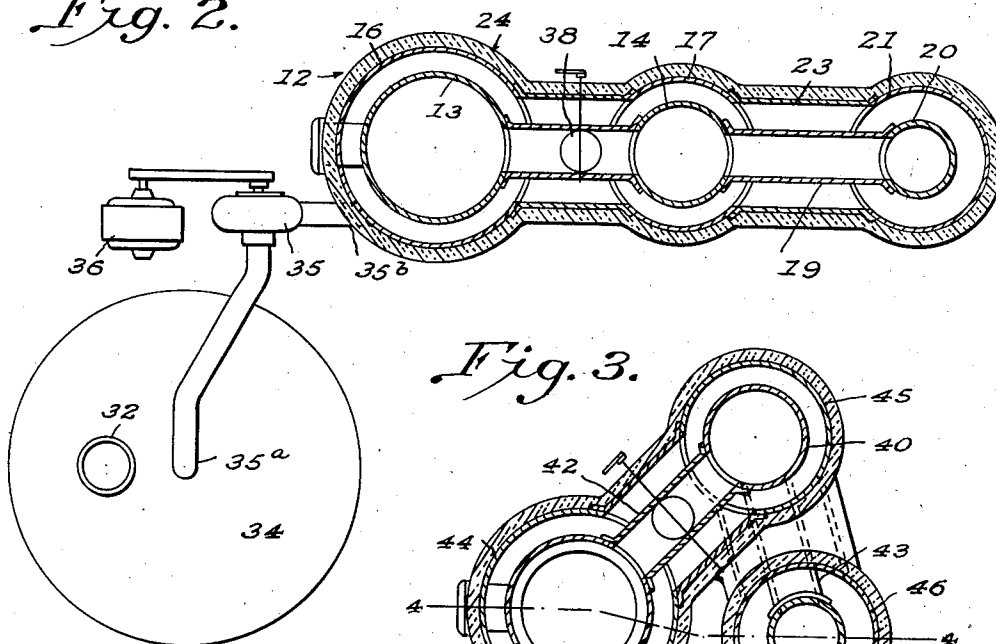


Fig. 3.

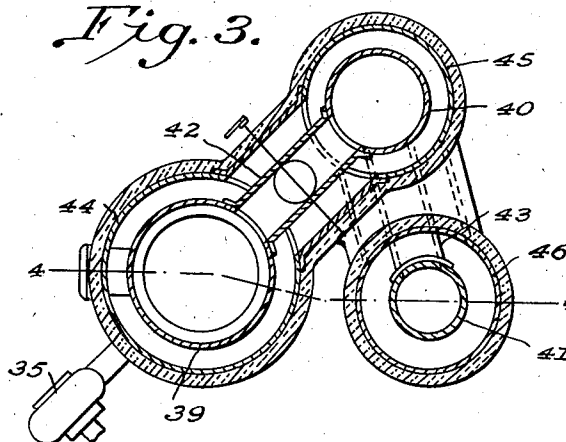


Fig. 4.

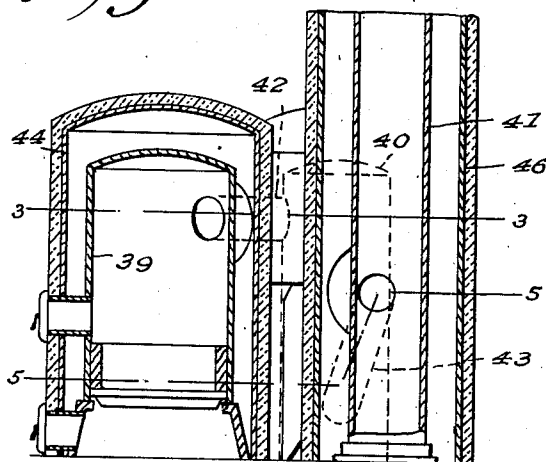
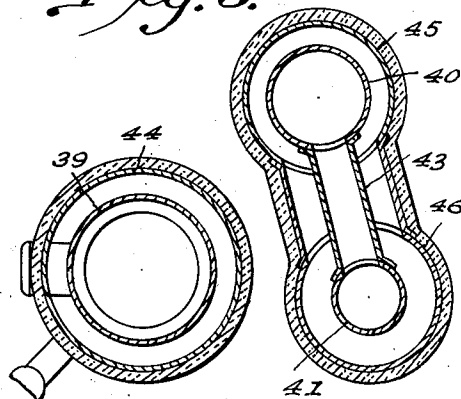


Fig. 5.



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UNITED STATES PATENT OFFICE

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HEATING AND AIR CONDITIONING SYSTEM

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3 Claims. (Cl. 237—55)

This invention relates to improvements in heating and air conditioning systems.

An object of the invention is to provide an improved heating and air conditioning system in which the temperature of the ground is utilized as heating means in winter and for cooling the air when the weather is warm.

Another object of the invention is to provide an improved system of the character referred to that will be relatively inexpensive to install and maintain, that will be efficient and economical in operation, and which can be easily regulated and quickly adjusted to serve as either a heating or cooling system.

Important novel features of the invention reside in the provision of a subterranean constant temperature air well and the special arrangement of the same with a hot air furnace in the system, the constant temperature air well serving as auxiliary heating means in the winter months and also for cooling and ventilating purposes.

Another important novel feature of the invention resides in the particular form of continuous hot air chamber or passage provided about the furnace, associated hot air drum, and the smoke flue to prevent loss of heat through the smoke flue.

The invention, with other objects, novel features and the advantages thereof, and the particular construction, combination and arrangements of parts comprising the same will be understood from the hereinafter contained detailed description, when considered in connection with the accompanying drawings forming part hereof and illustrating two embodiments of the invention.

In the drawings:

Figure 1 is a vertical section through part of a building and illustrating a heating and air conditioning system constructed in accordance with the present invention.

Fig. 2 is a horizontal section taken on the line 2—2 of Fig. 1.

Fig. 3 is a horizontal section on the line 3—3 of Fig. 4 illustrating a modified arrangement of the furnace, heating drum and smoke flue.

Fig. 4 is a vertical section taken substantially along the line 4—4 of Fig. 3, the air pipe and its connection with the furnace casing also being shown in this view.

Fig. 5 is a horizontal section on the line 5—5 of Fig. 4.

While two embodiments of the invention are illustrated in the drawings, it will of course be understood that minor changes and modifications may be made in the particular construction shown,

and the invention may be embodied in other forms as will appeal to those skilled in the art and falling within the scope of the appended claims, without departing from the spirit of the invention.

In Figure 1 of the drawings is shown by way of example, a residential building equipped with a heating and air conditioning system constructed in accordance with the present invention. In this view 9 designates a cellar apartment, 10 the main floor and 11 the attic.

Referring to a detailed description of the particular embodiment of the invention illustrated in Figures 1 and 2 of the drawings, 12 designates a furnace comprising a main body part 13 and a down draft section or heating drum 14, both of cylindrical form and vertically disposed side by side, the same being connected at their upper portions by a short horizontally extending pipe 15. The main body part 13 and the down draft section 14 are surrounded respectively by cylindrical casings 16 and 17, the casings being spaced from the walls thereof and being connected at their upper portions by a tubular connection 18 that is arranged concentric with and encloses the pipe connection 15. A pipe connection 19 leads from the lower part of the down draft section or heating drum 14 to the lower part of the smoke flue 20 extending from the floor of the cellar to the top of the building and out through the roof.

A metal casing 21 is provided about the metal smoke flue 20 to form a closed hot air chamber surrounding the same, said casing extending from the lower end of the smoke flue to near the roof of the building and being closed at its upper and lower ends. The down draft section or heating drum 14 is connected at its lower portion with the lower portion of the casing 21 by a tubular connection 23 which encloses the pipe connection 19 between the heating drum and the smoke flue, a continuous air heating chamber or passage being provided from around the main body part 13 of the furnace, downwardly around the down draft section or heating drum 14, and from the lower part thereof to the chamber surrounding the smoke flue, said continuous hot air chamber or passage being substantially coextensive with the passage for the hot products of combustion from the main body part of the furnace to the upper portion of the smoke flue. A continuous covering 24 of heat insulating material is provided around the casings 16 and 17, the tubular connections 18 and 23, and the casing 21 of the smoke flue.

Laterally extending ducts connect with the casing 21 of the smoke flue and lead to desired points.

In the drawings, lateral ducts 25, 26 are shown communicating with the attic 11 and the lower room 10^a through openings 25^a, 26^a, in the ceiling. A lateral duct 27 is also shown communicating with the lower room near the floor, this duct extending a short distance upwardly through the partition 28 to an opening 29 controlled by a register 30. Similar control registers may be provided for the outlets 25^a, 26^a of the lateral ducts 25, 26.

31 designates a return duct leading from the attic 11 into the lower room 10^a near the floor, and 32 is a return duct that leads from an opening 33 in the lower floor 10 to an air well 34, which is located in the ground at a depth of eighteen feet or thereabouts sufficient so that it will be surrounded by earth of substantially constant temperature and will have substantially the same temperature at all times. The air well 34 has porous side and bottom walls 34^a, 34^b to permit the passage of air through the same to the interior of the air well, said walls being formed of tile, concrete or other suitable material. A fan 35 or other suitable air pump driven by a motor 36 is provided for drawing air from the earth into the air well through the porous walls thereof, and forcing it from the air well into the furnace casing 16 and then on through the casing 17 and upwardly through the casing 21 surrounding the smoke flue 20, the suction pipe 35^a of the fan 35 extending down into the air well, and the fan outlet 35^b being connected with the furnace 16, as shown. As will be understood, a constant circulation of air from the air well may be maintained, the air passing through the heating chambers provided by the casings 16, 17 and 21, to the lateral distributing ducts into the rooms and then returning through the return duct 32. The return duct 32 is provided with a damper 32^a to provide for closing or partially closing the same when the system is used for cooling purposes only. A thermostatic control is provided for automatically regulating the operation of the furnace 12, when the system is operated for heating purposes.

Any of the well known conventional types of thermostatic control may be employed and the same is only indicated in a general way in the drawings as comprising a thermostatic device 36 located in the lower room 10^a and operatively connected by a cable 37 with a damper 38 in the pipe 15 that connects the furnace 13 with the heating drum 14.

As will be understood, the subterranean air well 34 will have the same temperature the year round, and in winter is used for heating the air, and for cooling the air in warm weather. The temperature of the earth about eighteen feet down is about 55° F. so that for winter heating, the furnace 12 need only be operated sufficiently to increase the temperature of the air from the air well about 25°, the air well being of material advantage as auxiliary heating means and providing for a substantial saving in the cost of heating. When the system is operated for heating purposes, the damper 32^a in the return duct 32 is kept in open position, the return air duct then acting to equalize the house pressure. When used independently of the furnace for cooling, the damper 32^a may be closed and only fresh cool air from the air well forced into the system to the lateral distributing ducts into the rooms.

By the special construction and arrangement of parts hereinbefore set forth, a system is afforded that will be efficient and economical in operation. It is of simple construction, can be easily regu-

lated, and can be used for either heating or cooling without requiring any change in structure.

The modified construction illustrated in Figures 3, 4 and 5 of the drawings, is the same as that hereinbefore described and illustrated in Figures 1 and 2, except that the smoke flue is offset out of serial alignment with the furnace and heating drum, and is brought closer to the furnace, so that a more compact arrangement is afforded. In these views, 39 designates the furnace, 40 the heating drum and 41 the smoke flue. 42 is the horizontal pipe connection between the upper part of the furnace and the heating drum 40, and 43 designates the pipe connection between the lower part of the heating drum 40 and the smoke flue 41. 44, 45 and 46 designate respectively the casings of the furnace 39, heating drum 40 and smoke flue 41.

What I claim is:

1. In a heating and air conditioning system, the combination with a building, of a furnace having a vertically extending combustion chamber and a casing surrounding the same, an elongated cylindrical vertically extending heating drum of substantially the same height as the combustion chamber arranged alongside the furnace, a casing surrounding said drum, a pipe connection between the upper part of the furnace chamber and the upper part of the heating drum, a tubular connection between the upper part of the furnace casing and the upper part of the drum casing surrounding said pipe connection, a smoke flue, a casing surrounding the smoke flue to provide a closed hot air chamber thereabout extending to the upper part of the building, a pipe connection between the lower part of the heating drum and smoke flue, a tubular connection between the lower part of the drum casing and the casing of the smoke flue and surrounding said last mentioned pipe connection, ducts leading from the hot air chamber surrounding the smoke flue to rooms of the building, and a fresh air supply duct leading to the furnace casing.

2. In a heating and air conditioning system, the combination with a building, of a furnace having a vertically extending combustion chamber and a casing surrounding the same, an elongated cylindrical vertically extending heating drum of substantially the same height as the combustion chamber arranged alongside the furnace, a casing surrounding said drum, a pipe connection between the upper part of the furnace chamber and the upper part of the heating drum, a tubular connection between the upper part of the furnace casing and the upper part of the drum casing surrounding said pipe connection, a smoke flue, a casing surrounding the smoke flue to provide a closed hot air chamber thereabout extending to the upper part of the building, a pipe connection between the lower part of the heating drum and smoke flue, a tubular connection between the lower part of the drum casing and the casing of the smoke flue and surrounding said last mentioned pipe connection, said furnace, heating drum, and smoke flue being arranged in serial alignment with each other, ducts leading from the hot air chamber surrounding the smoke flue to rooms of the building, and a fresh air supply duct leading to the furnace casing.

3. In a heating and air conditioning system, the combination with a building, of a furnace having a vertically extending combustion chamber and a casing surrounding the same, an elongated cylindrical vertically extending heating

drum of substantially the same height as the combustion chamber arranged alongside the furnace, a casing surrounding said drum, a pipe connection between the upper part of the furnace chamber and the upper part of the heating drum, a tubular connection between the upper part of the furnace casing and the upper part of the drum casing surrounding said pipe connection, a smoke flue, a casing surrounding the smoke flue to provide a closed hot air chamber thereabout extending to the upper part of the building, a pipe connection between the lower part of the

heating drum and smoke flue, a tubular connection between the lower part of the drum casing and the casing of the smoke flue and surrounding said last mentioned pipe connection, said smoke flue being offset out of serial alignment with the furnace and heating drum adjacent the same, ducts leading from the hot air chamber surrounding the smoke flue to rooms of the building, and a fresh air supply duct leading to the furnace casing.

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