Jan. 13, 1953 H. W. KELLY 2,625,151

FLOOR FURNACE WITH REMOVABLE HEATING UNIT

Filed Nov. 24, 1950 3 Sheets-Sheet 1

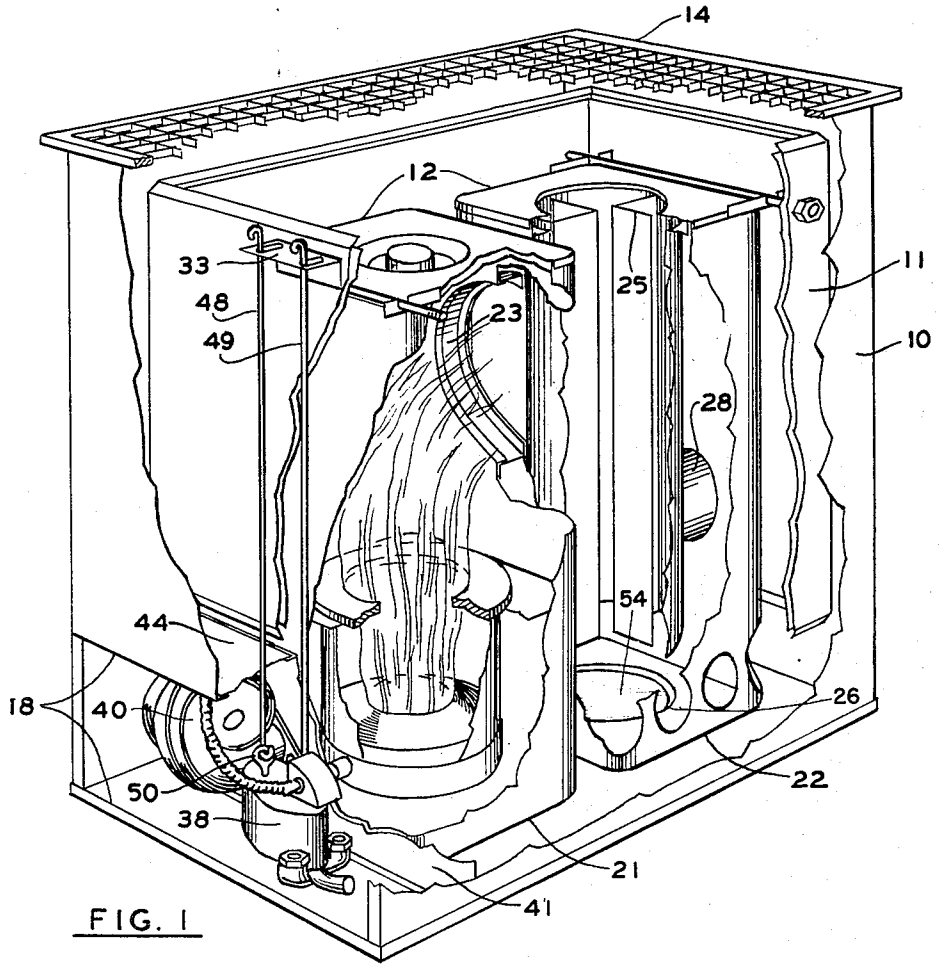


FIG. 1

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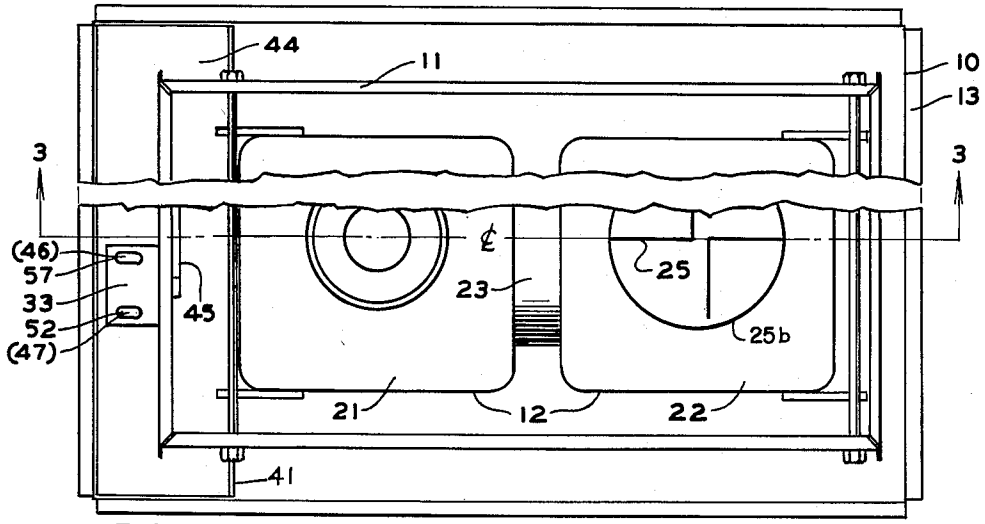


FIG. 2

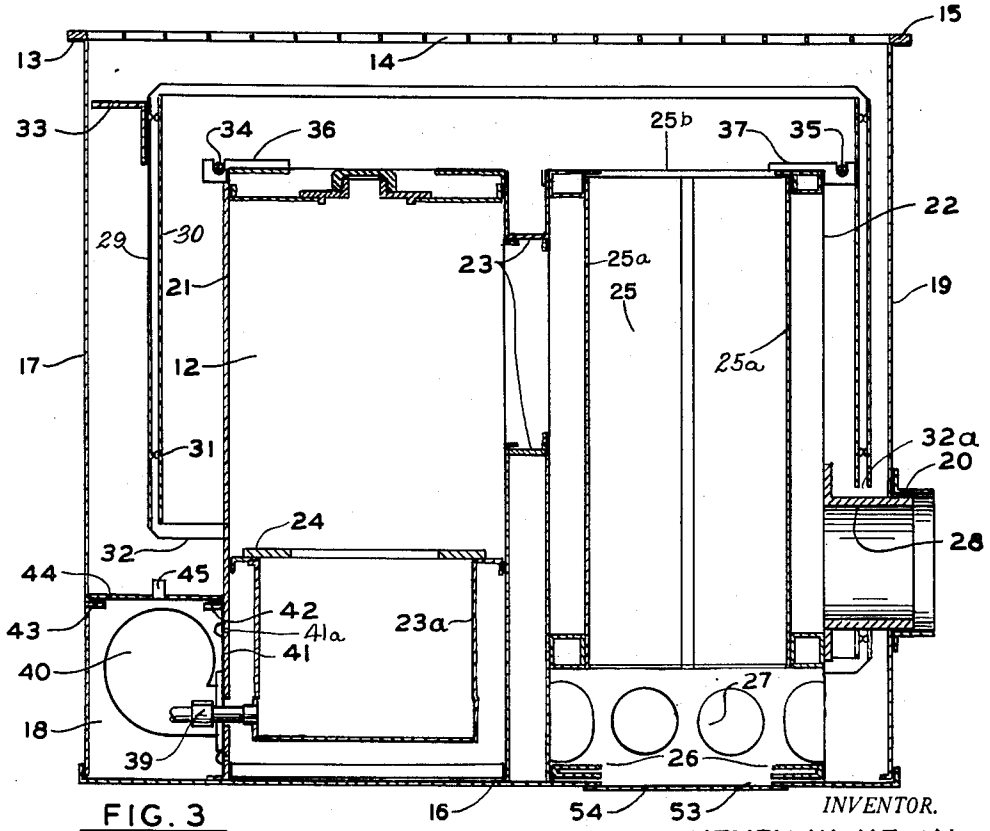


FIG. 3

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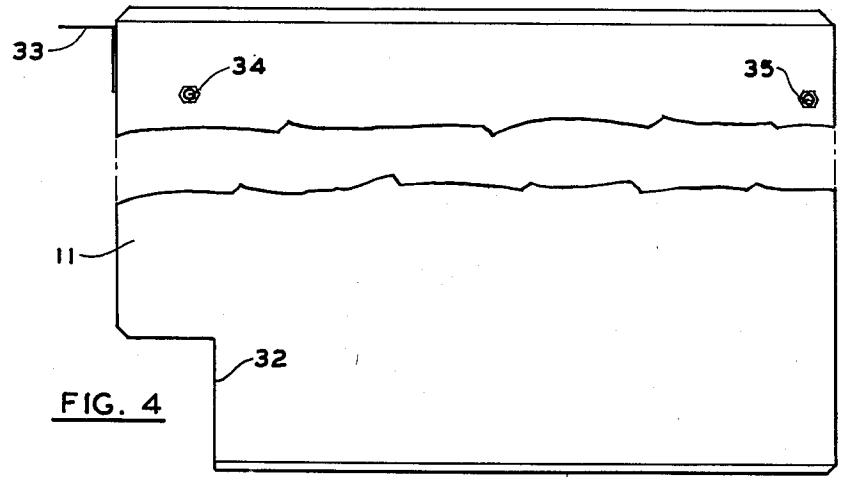


FIG. 4

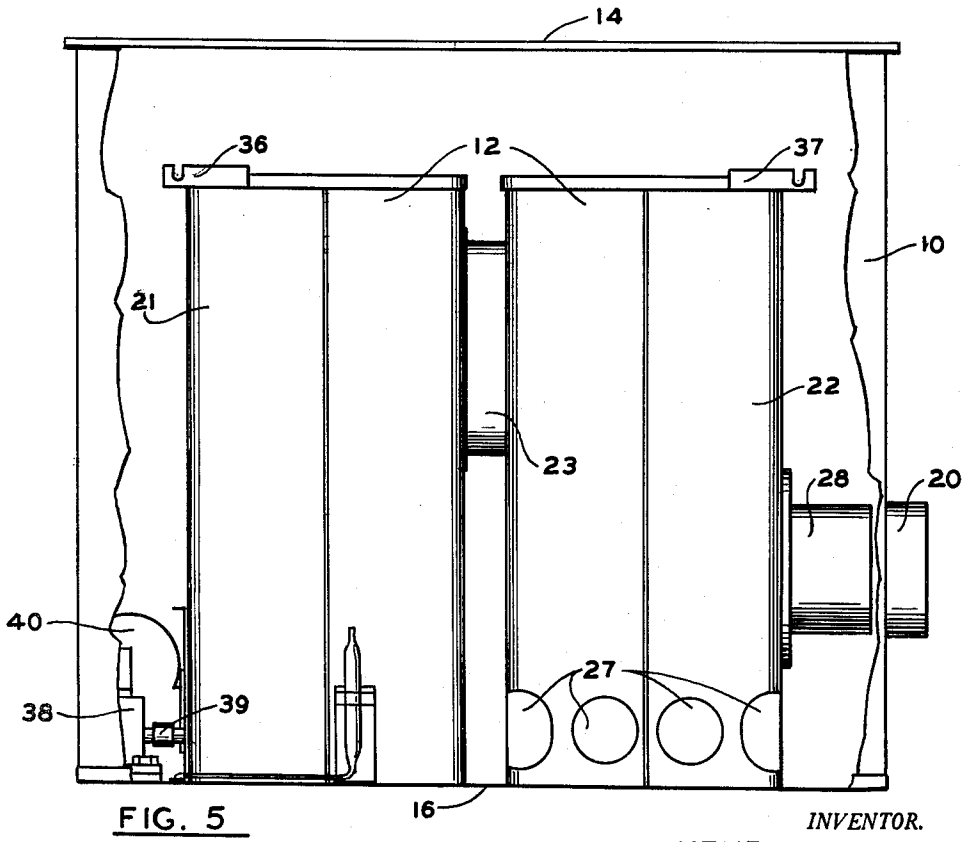


FIG. 5

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UNITED STATES PATENT OFFICE

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FLOOR FURNACE WITH REMOVABLE HEATING UNIT

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Application November 24, 1950, Serial No. 197,388

4 Claims. (Cl. 126—116)

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My invention relates to a floor furnace. It has to do, more particularly, with that type of furnace adapted to be disposed directly beneath the floor of a building and requiring only sufficient room beneath the floor for receiving the furnace and making the necessary connections to the fuel supply and flue. My invention will be described with particular reference to an oil furnace although it should be understood that most of the features of my invention are equally applicable to gas furnaces.

This application is a continuation-in-part of my copending application Ser. No. 97,801, filed June 8, 1949, now Patent No. 2,589,702, granted March 18, 1952.

One of the objects of my invention is to provide a floor furnace of the type indicated which is so designed and constructed that it is of minimum height or depth and will, therefore, fit into a very shallow space beneath a floor.

Another object of my invention is to provide a floor furnace of the type indicated which is so designed and constructed that for ordinary servicing the fuel valve and burner clean-out plug can be reached from floor level.

Another object of my invention is to provide a floor furnace of the general type indicated wherein all necessary parts thereof can be easily and quickly removed for major servicing and cleaning from a point above the floor.

Another object of my invention is to provide a structure of the type indicated in the preceding paragraph which is of such a nature that the combustion chamber and the heat radiator can be connected together as a single unit thereby eliminating the need of a separable connection between the two and eliminating the possibility of escape of gases or fumes at such connection.

Another object of my invention is to provide a structure of the type indicated above wherein the combustion chamber and heat radiator are made as a single unit which can be inserted easily in the outer casing and can be removed therefrom easily and which also can be connected to and disconnected from the main flue with ease and which when connected to the flue is so connected that there will be no danger of escape of fumes.

Another object of my invention is to provide a floor furnace of the type indicated above wherein the heat radiator is provided with a connection that may be closed by a suitable closure, which may be opened to permit withdrawal of cold air from the basement or space in which it is disposed or which may be connected to a cold air

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duct leading to a remote part of the building which is difficult to heat.

Still another object of my invention is to provide a furnace having a casing with a closed bottom upon which said combustion chamber and heat radiator unit is directly supported in such a manner as to permit the necessary movements thereof to facilitate positioning of such unit in the furnace casing and connection to the flue, and to facilitate disconnection from the flue and removal from the casing.

A further object of my invention is to provide a furnace of the type indicated wherein a liner is provided within the casing but is supported independently of the casing so that it is free to expand and contract independently and will remain at a constant level.

Still another object of my invention is to provide a structure of the type indicated which permits servicing from above the floor and which has the other desirable features indicated and which still is less costly than prior art structures.

Various other objects will be apparent.

According to my invention, I provide a floor furnace which comprises an outer casing of substantially rectangular form which will be disposed in a receiving opening provided in the floor and which will be suspended therein. The lower end of the casing is closed by a flat bottom. This flat bottom is adapted to directly support the flat bottom of the combustion chamber and heat radiator unit of the furnace. This latter unit consists of the combustion chamber and the heat radiator which are disposed side-by-side and are connected together at their upper ends by a permanent connection or duct which permits passage of the heated gases from the combustion chamber to the radiator. Between the combustion chamber and radiator unit and the main casing, a liner assembly is disposed. This assembly is suspended from the combustion chamber and radiator unit and is, therefore, supported independently of the casing. This permits expansion and contraction of the liner more freely and ensures that it will always be supported at a constant level within the casing. Since the combustion and radiator unit is supported directly on the base, the furnace can be of a minimum height or depth. The fuel valve is disposed at one end of the casing between an end wall of the casing and the corresponding end of said unit on the bottom of the casing. If the furnace is to be of the forced draft type, the blower is disposed at the same end adjacent the fuel valve and between the end of said unit and end wall of the

casing and may be mounted on the end of said unit. The blower and valve are mounted in a separate chamber, the top of which is closed by a removable plate so that these members can be reached from floor level for normal servicing. Since these members are provided at one end of the said unit rather than below it, the height of the furnace is greatly reduced. Since the bottom of the casing directly supports the combustion and radiator unit, this unit can be moved on the bottom longitudinally of the casing to a limited extent, after the liner has been removed. The radiator is provided with a flue connection at the end of the unit opposite to that where the valve is disposed and is adapted to be slipped through a flue opening in the adjacent end wall of the casing. Limited sliding movement of the unit on the casing bottom in a direction axially of the flue connection, will permit insertion of such connection into such flue opening and removal therefrom, without disassembling the combustion chamber and radiator of the unit. This will permit disconnection from the flue and removal of the entire unit by lifting it from the casing for major servicing. It will be understood that the said unit plus its flue connection will be of less length than the casing to permit movement of the unit into and out of the casing through the upper end thereof.

The bottom of the heat radiator and the bottom of the casing are provided with aligning inlet openings. The opening in the casing is normally closed by a removable closure plate. In some instances, it is desirable to remove this closure plate to connect the radiator to a cold air supply in a remote space or room to be heated by the furnace, in addition to the main room to be heated thereby.

The preferred embodiment of my invention is illustrated in the accompanying drawings wherein similar characters of reference designate corresponding parts and wherein.

Figure 1 is a perspective view, with parts cut away, of a furnace constructed according to my invention.

Figure 2 is a plan view, partly cut away, of the furnace of Figure 1 with the floor grill removed.

Figure 3 is a schematic sectional view taken substantially on line 3—3 of Figure 2 showing the flue connection of the combustion and radiator unit in the flue opening in the casing.

Figure 4 is a side elevational view, partly cut away, of the liner removed from the furnace.

Figure 5 is a side elevational view, partly cut away, showing the furnace with the liner removed and with the combustion and radiator unit on the bottom of the casing but with its flue connection not disposed in the flue opening in the casing.

With reference to the drawings, I have illustrated my furnace as comprising mainly an outer casing unit **10**, an intermediate liner unit **11**, and an inner combustion chamber and heat radiator unit **12**.

The outer casing **10** is preferably of rectangular form and is made of suitable sheet metal. This casing is adapted to be inserted downwardly into a receiving opening formed in a floor or other support. The upper edge of the casing is provided with a peripheral flange **13** (Figure 3) which will rest on the floor around the opening and suspend the furnace therefrom. The upper end of the casing is adapted to removably receive a floor grill **14** which has a peripheral flange **15** that rests on the flange **13**. The lower side of the casing is closed substantially by a flat bottom **16**. One end wall **17** of the casing **10** is provided with a transverse slot or opening **18** (Figure 1) at its lower end which permits passage of air into the lower portion of the casing. The other end wall **19** of the casing is provided with a flue opening, above its lower end, surrounded by a collar or adapter **20**.

The unit **12**, that is the combustion and heat radiator or heat exchange unit, is formed as a single unitary structure and is adapted to rest directly on the bottom wall **16** of the casing. This unit includes the upstanding combustion chamber **21** and the upstanding heat radiator or heat exchange member **22**. These members **21** and **22** are preferably of substantially square cross-section and are disposed side-by-side. The upper ends of these members **21** and **22** are connected together by a duct or collar **23** which is suitably fixed to both of the members **21** and **22** and in communication with the interiors thereof. The combustion chamber **21** may be provided with a pot type burner **23***a* at the lower end thereof and with a removable lid **24** at the upper end thereof which permits access to the burner. The heat exchange member **22** may be provided with an air heating tube **25***a* which is suitably secured to the top wall thereof in communication with a centrally disposed opening **25***b*, the bottom of the tube being spaced above the bottom of member **22**. Within the tube **25***a*, I preferably provide the vertically disposed heat exchange members **25**. It will be noted that the lower ends of the members **21** and **22** are flat and will rest directly on the bottom wall **16** of the casing. The lower end of radiator **22** is provided with an inlet opening **26** and with a plurality of openings **27** in the side walls thereof at the lower edges of such walls. The lower end of the radiator **22** is provided with a flue extension **28** in communication therewith and extending to the right therefrom. This extension is adapted to be positioned in the collar or adapter **20** carried by the casing as shown in Figure 3.

The intermediate liner unit **11** is of the same cross-sectional shape as the outer casing **10** but is smaller so that it will be spaced within the casing. The unit **12** is smaller in cross-sectional area than the unit **11** and will be disposed therewithin in spaced relationship thereto. The liner unit is of the double type and consists of the spaced walls **29** and **30** which are held in spaced relationship by the clips **31**. Each side wall of liner is notched out at its lower left-hand corner, as indicated at **32**. The end wall of liner at the same end carries a control guide bracket **33**. The other end wall is notched out at its lower edge as indicated at **32***a* (Figure 3). The liner unit **11** is provided with transversely extending rods **34** and **35** at its opposite ends spaced just below the upper edges thereof. These rods are adapted to suspend the liner in position within the casing **10**. The rod **34** fits into notches in a pair of brackets **36** at the left end of the furnace and the rod **35** fits into notches in a pair of brackets **37** at the other end of the furnace. The brackets **36** are carried by the member **21** and the brackets **37** are carried by the member **22** at the upper ends thereof and project outwardly therefrom. Thus, the liner is suspended from the unit **12** rather than from the casing unit **10**. The liner can be removed merely by lifting it so that the rods **34** and **35** are lifted from the notches in the brackets **36** and **37**.

As previously indicated, the unit **12** rests directly on the bottom of the casing. No parts of

the furnace are located between the bottom of the unit 12 and the bottom wall 16 of the casing. This makes it possible to keep the furnace height down to a minimum.

For this purpose the fuel valve 38 is located at one end of the casing adjacent the slot 18. This valve 38 is attached to the bottom wall 16 of the casing and is connected to the burner 23a by a removable coupling 39. Next to the control valve 38 I may provide the fan or blower 40. If this fan or blower is used, it will preferably be attached to a vertically disposed plate 41 which is attached to the combustion chamber 21 by screws 41a and will be removable with the unit 12. This plate 41 extends transversely of the casing the full width thereof and has an inwardly extending flange 42 on its upper edge. The plate 41 has an opening in registration with a like opening in the wall of the combustion chamber 21 and through which air is delivered from the blower 40 into the plenum chamber surrounding the burner 23a. Resting on the flange 42 and on a flange 43 on the casing at the upper edge of slot 18 is a removable lid or plate 44 provided with handle 45. This plate serves to prevent circulation of air upwardly through the slot 18 and on into the casing 10. It also protects the blower 40 and valve 38 from dirt and dust falling through the grill 14. This plate is provided with slots 46 and 47 through which the control rods 48 and 49 pass. The lower ends of these rods are hooked to their respective control members, as indicated at 50, so that they can be easily disconnected therefrom. The rods pass upwardly through slots 51 and 52 in the bracket 33.

In installing a furnace, the casing unit 10 is first positioned in the floor opening. Then the unit 12 is moved downwardly within the casing and is rested on the bottom thereof, as shown in Figure 5. It will be noted that the length of the unit 12 plus the flue extension 28 is less than the length of the casing 10 so that it can be inserted therein. It will also be noted that the ends of plate 41 will cooperate with the side walls of casing 10 to locate the unit 12 laterally of the casing. The unit 12 is now slid to the right a short distance to position the flue extension 28 within the adapter 20 as shown in Figure 3. Next, the valve 38 is coupled to the burner 23a and the plate 44 is positioned on the flanges 42 and 43. Then the liner 11 is inserted and is suspended from the unit 12. The notches 32 are provided in the liner so that there will be no interference with the lid 44 and plate 41. The notch 32a is provided so that there will be no interference with flue extension 28. The control rods 48 and 49 are then positioned as indicated.

For ordinary servicing of the valve 38 and associated parts, such as the burner clean-out plug (not shown), it is merely necessary to remove the grill 14 and then to lift the plate 44 upwardly by means of the handle 45, the slots 46 and 47 permitting tilting of the plate relative to the rods 48 and 49. Then the valve and associated parts can be reached. Lifting of the plate 44 and servicing of the valve and associated parts can be accomplished from the floor level due to the shallow nature of the furnace. For major servicing, the grill 14 is first removed, the rods 48 and 49 and plate 44 are removed, and then the liner 11 is lifted from the casing. Then, after coupling 39 is disconnected, it is possible to shift the unit 12 from the position shown in Figure 3 to the position shown in Figure 5. This can be accomplished easily since unit 12 will merely slide on the bottom 16 of the casing. In this new position, the unit 12 can be lifted from the casing 10 and be completely cleaned or serviced. The unit 12 can be repositioned within the casing 10, in a similar manner, the various furnace parts being repositioned in a reverse order.

In some instances, it may be desirable to have a cold air duct run to a remote room or space to be heated. For this purpose the casing 10 is provided with an opening 53 directly below the opening 26 at the lower end of member 22. This opening may normally be closed by a removable plate 54.

It will be apparent from the above description that I have provided a furnace wherein normal servicing of the valve 38 and associated parts can be accomplished from floor level merely by lifting plate 44 after the grill 14 is removed. For major servicing operations, the unit 12 can be completely removed from the casing 10 and this can also be accomplished from floor level. The liner 11 is supported independently of the casing so that it can expand and contract more freely and will always be of the same level. Since the unit 12 rests directly on the bottom 16 of the casing, no parts being located between these members, the furnace is of minimum height and, therefore, it will more readily fit into a shallow space beneath the floor.

Various other advantages will be apparent.

Having thus described my invention, what I claim is:

1. A floor furnace comprising an outer vertical casing of substantially rectangular form and having its upper end open but adapted to be covered by a removable grill, said casing having a flue opening in one of its side walls, an adapter collar disposed around said opening and secured to said casing in fixed position, said adapter collar having an axially extending portion for telescopically receiving the end of a smoke pipe, a heating unit including a burner disposed within said casing and having a flue connection secured thereto in fixed position thereon and projecting from one side of the unit, said heating unit including said flue connection being substantially smaller than said casing in a direction axially of said flue connection to permit vertical movement of said unit into and out of said casing, said casing having a flat bottom wall and said heating unit having a flat bottom which slidably rests directly on said casing bottom wall with its flue connection extending axially in the same direction as said adapter collar, so that said heating unit is supported for sliding movement in a direction axially of said flue connection and adapter collar for the purpose of moving said flue connection axially into and out of telescoping relationship with said adapter collar, said flue connection of said unit being located at the same distance above the bottom of said heating unit as the adapter collar is located above the bottom of said casing so that when the unit is supported on the casing bottom their levels correspond, said flue connection being of a size relative to said adapter to telescope snugly therewith so that only relative axial movement thereof is permitted, a transversely extending vertical plate attached to the end of said heating unit opposite said flue connection and having its outer ends disposed closely adjacent the associated walls of said casing so as to cooperate therewith to properly locate the heating unit laterally relative to the casing to aid in aligning said flue connection laterally with said adapter collar, said vertical

plate being spaced from the adjacent wall of the casing which is opposite the casing wall that supports said adapter collar when the flue connection of the heating unit telescopes with the adapter collar, a fuel valve in such space and connected to the burner to supply fuel thereto, a cover movably mounted above the valve, and a support on said adjacent wall of the casing for supporting one edge of said cover, said transversely extending vertical plate on the adjacent end of said heating unit supporting the other edge of said cover.

2. A floor furnace according to claim 1 including a liner of rectangular form, means for suspending said liner directly from said heating unit and independently of the casing between the casing and the unit, said liner being notched at its adjacent end so as not to interfere with said cover, and being notched at its opposite end so it will slip over said flue connection.

3. A floor furnace according to claim 2 wherein the valve is attached to the bottom of the casing.

4. A floor furnace according to claim 3 wherein a blower is also disposed in said space but is attached to said transverse vertical plate carried by said heating unit and is connected to said heating unit to supply air to said burner.

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