March 18, 1952 H. W. KELLY 2,589,702

FLOOR FURNACE WITH REMOVABLE HEATING UNIT

Filed June 8, 1949 3 Sheets-Sheet 1

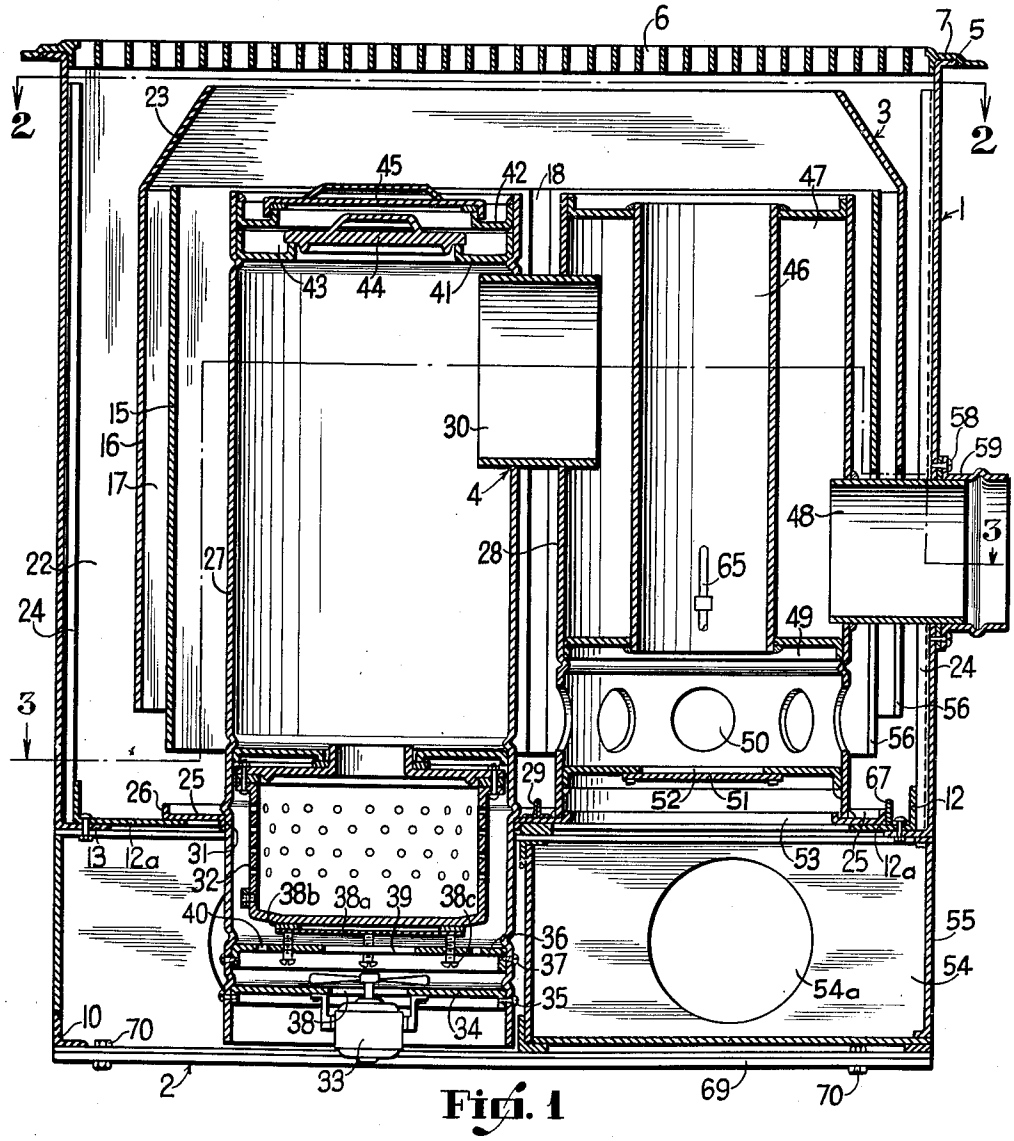


Fig. 1

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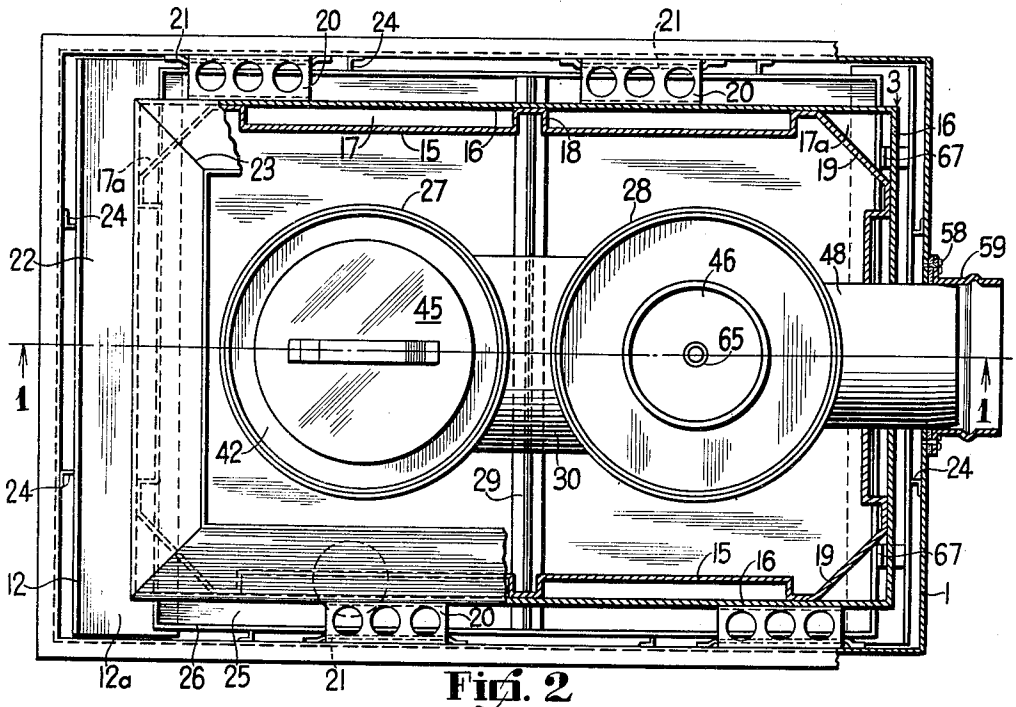


Fig. 2

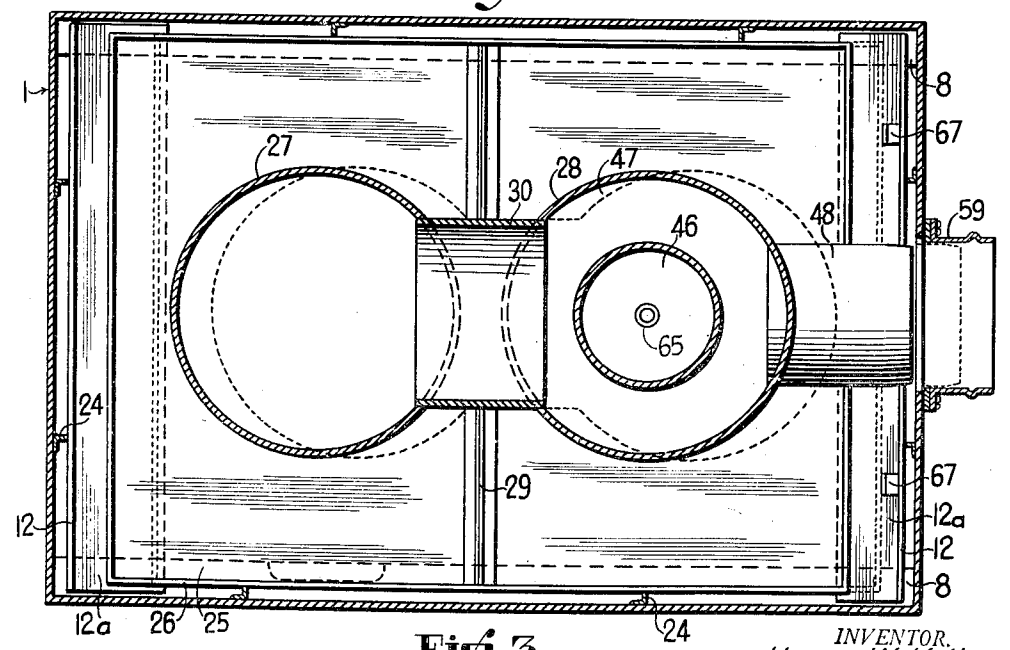


Fig. 3

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FLOOR FURNACE WITH REMOVABLE HEATING UNIT

Filed June 8, 1949 3 Sheets-Sheet 3

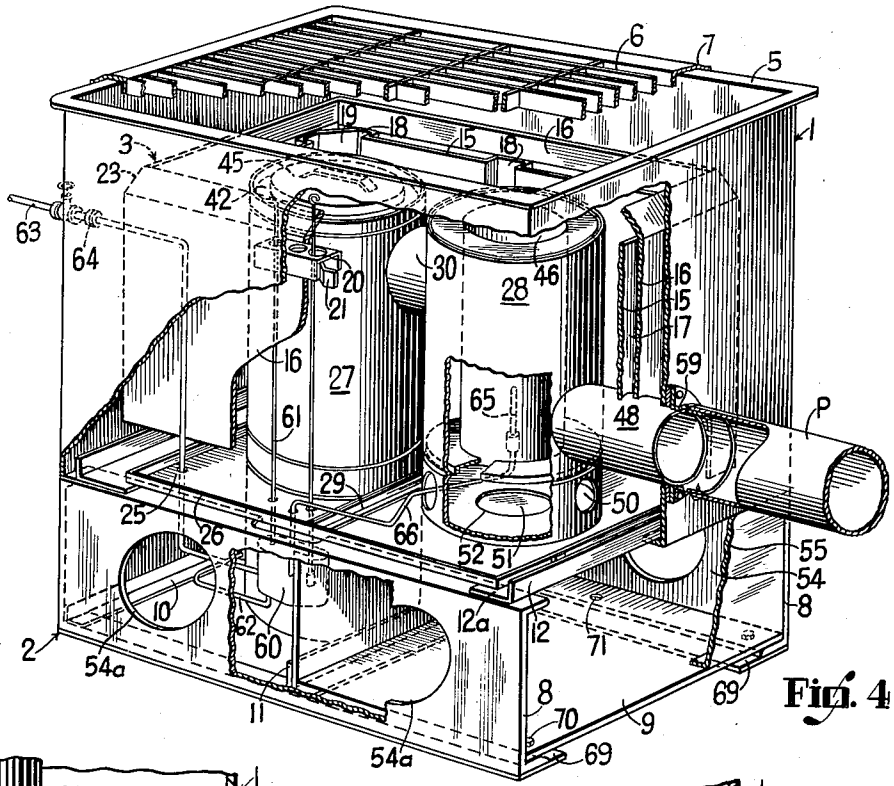


Fig. 4

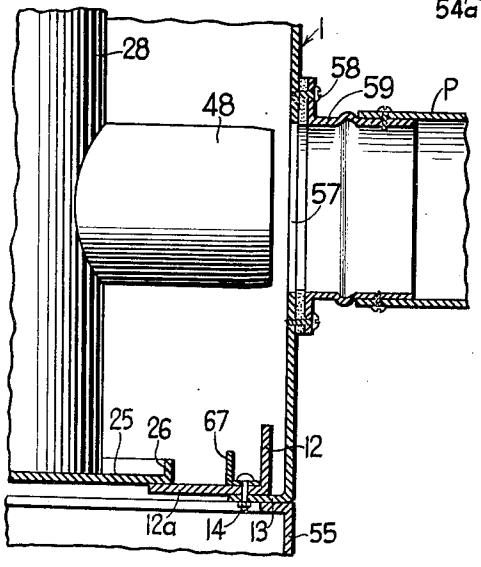


Fig. 5

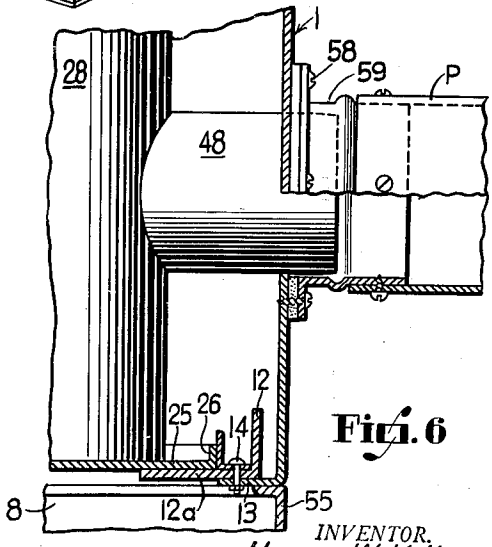


Fig. 6

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Patented Mar. 18, 1952

2,589,702

UNITED STATES PATENT OFFICE

2,589,702

FLOOR FURNACE WITH REMOVABLE HEATING UNIT

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Application June 8, 1949, Serial No. 97,801

6 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.

Since floor furnaces are usually disposed in such limited space below the floor that it is impossible or very difficult, in most cases, to gain access to them from beneath the floor, it would be very desirable to have the furnace so constructed that it could be cleaned and serviced from above the floor. Attempts have been made to construct floor furnaces in this manner but have not met with any degree of success. Floor furnaces usually are provided with a cylindrical combustion chamber and a cylindrical heat radiator disposed side-by-side in a suitable casing, or with both as a single unit. The chamber must be connected to the heat radiator by a connecting duct, or in the case of a combined unit it must be connected to a flue extension. In order to permit removal of the combustion chamber and radiator from the casing, this connecting duct has usually been made in the form of a split collar which would permit separation of the combustion chamber and radiator and separate removal thereof from the casing or separation of a combined unit and the flue extension. Obviously, such a split collar structure is difficult to seal effectively and is difficult to connect and disconnect.

One of the objects 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 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 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

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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.

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.

A further object of my invention is to provide a supporting base structure for the furnace which is so constructed that it will support the combustion chamber and heat radiator unit within the casing of the furnace in proper position for connection to the flue and which is of extremely rigid and sturdy structure.

Still another object of my invention is to provide a supporting base structure of the type indicated which cooperates with said combustion chamber and heat radiator unit in such a manner as to permit the necessary movements thereof, while supported on the base, 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.

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. Attached to the lower part of the casing is the novel base structure which I provide which will support the combustion chamber and heat radiator of the furnace and which will protect the combustion chamber and associated burner. The combustion chamber and heat radiator are both of cylindrical form and are carried by a suitable supporting plate so that they constitute a single unit. The combustion chamber and heat radiator are disposed side-by-side on the supporting plate 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. The supporting base is of such a nature that it supports the supporting plate of the combustion chamber and heat radiator unit for limited movement thereon. This limited movement provides for connection of the

radiator to the flue and disconnection therefrom without separating the combustion chamber from the radiator.

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 vertical sectional view through a floor furnace constructed according to my invention, the view being taken along line 1—1 of Figure 2.

Figure 2 is a horizontal sectional view through the furnace taken substantially along line 2—2 of Figure 1.

Figure 3 is a similar horizontal sectional view taken along line 3—3 of Figure 1.

Figure 4 is a perspective view, partly broken away, of my furnace.

Figure 5 is an enlarged detail illustrating how the combustion chamber and heat radiator unit is initially disposed in the furnace casing.

Figure 6 is a similar view illustrating the final position of such unit in the outer casing when it is moved to properly connect it to the flue.

With reference to the drawings, in Figures 1 to 4 inclusive, I have illustrated the structure of my furnace and it comprises in general, an outer casing unit 1, a supporting base structure 2, a liner unit 3, and a combustion chamber and heat radiator unit 4.

The outer casing 1 is preferably of rectangular form and is made of suitable sheet metal. This casing is adapted to be inserted downwardly into the receiving opening O formed in the floor F, as shown best in Figure 9. The upper edge of the casing is provided with a peripheral flange 5 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 grille 6 which has a peripheral flange 7 that rests on the flange 5.

The supporting base 2 is of rigid and sturdy structure so as to protect the lower part of the furnace during shipping and so as to adequately support the unit 4 and associated parts of the furnace when installed in the floor. This base includes the two longitudinally extending inwardly directed channels 8 (Figure 4) which extend the full length of the casing and which have their outer surfaces flush with the sidewalls thereof and their ends flush with the end walls thereof. The lower flanges of the channels 8 support a plate 9 which may be welded thereto and which is disposed at the one end of the furnace, and also support a transversely extending angle member 10 at the other end of the furnace which is welded thereto. Intermediate their ends the channels have resting on their lower flanges an angle iron 11 which extends transversely and has its ends welded thereto. The top flanges of the channels 8 are joined together by angle members 12 disposed at each end thereof and welded to the upper flanges thereof. It will be noted from Figures 4, 5, and 6 that the horizontal flanges 12*a* of these angle members are inwardly directed and are of substantial width. Thus it will be noted that the base 2 is a rigid and sturdy structure. The casing 1 is attached to the base 2 by means of the inwardly turned flanges 13 (Figures 1, 5 and 6) which are provided on the end walls of the casing and which extend beneath the angle irons 12, being bolted thereto by means of bolts 14.

The liner unit 3 comprises an inner liner 15 and an outer liner 16 which are formed of metal, are of substantially rectangular form and are so

arranged as to provide passageways 17 therebetween. At certain points indicated by the numerals 18, the inner liner is provided with vertical ribs which contact with the outer liner, which may be welded or otherwise secured to the outer liner and which provide for the vertical passageways 17 therebetween. The corners of the inner liner are provided with angularly disposed portions 19 which serve to provide passageways 17*a* extending vertically between the two liners at the corners.

The liner unit 3 is supported within the outer casing 1 by means of the angle member brackets 20 welded to the outer surface of the liner 3. These brackets have downturned flanges (Figure 4) which slip into sockets provided by clips 21 welded to the interior surface of the casing. Thus, these brackets 20 and clips 21 removably support the liner unit within the casing 1 and in spaced relationship thereto so as to provide a vertical passageway 22 between the liner unit and casing and extending completely therearound. It will be noted that the upper end of the outer liner 16 is turned inwardly as indicated at 23 in Figure 1. As shown best in Figure 2, the inner wall of the casing 1 is provided with vertically disposed angle members 24 which serve as reinforcing means.

The combustion chamber and heat radiator unit 4 is formed as a single unitary structure which is supported by a base plate 25, as shown in Figure 4. This base plate is formed of sheet metal and has an upturned peripheral flange 26 for reinforcement. This plate will have its ends resting on the flanges 12*a* of the angle members 12. The plate 25 supports the upstanding combustion chamber 27 and the upstanding heat radiator or heat exchange member 28. These members 27 and 28 are preferably of cylindrical form and are disposed side-by-side on the plate 25. Between the members 27 and 28, the plate is provided with a transversely extending reinforcing rib 29 which may be formed of angle iron. The upper ends of the cylindrical members 27 and 28 are connected together by a duct 30 which may be welded to both members.

It will be noted best from Figure 1, that the member 27 extends downwardly through an opening 31, provided in the plate 25, to a point substantially at the lower side of the base 2. This extending portion of the member 27 serves as a housing for the main part of a burner unit 32 and for a fan 33. The fan 33 is supported by a plate 34 disposed within the extreme lower end of member 27 and secured in position by screws 35. Above the plate 34 a plate 36 is supported in position within member 27 by means of screws 37. This plate is provided with a plurality of upstanding set screws 38*c* that butt against a steel vaporizer plate 38*a*, that, in turn, has an asbestos pad 38*b* between it and the bottom of the burner said asbestos pad being for the purpose of holding heat in the burner bottom for the purpose of maintaining constant vaporization. The burner unit 32 may be of any suitable type. A central opening 38 is provided in the lower plate 34 and permits air to be drawn into the burner unit for combustion purposes. The plate 36 is provided with a large central inlet opening 39 and with a plurality of surrounding small inlet openings 40. This causes the air current produced by the fan to be broken up and to flow outwardly and then inwardly up through the burner openings. The upper end of the combustion chamber 27 is closed by means of the

spaced plates 41 and 42 which provide an insulating dead air space 43 therebetween. The plate 41 is provided with a removable closure 44 and the plate 42 is provided with a removable closure 45 to permit access to the interior of member 27, it being noted that the outer closure 45 is larger than the inner closure 44.

The member 28 (Figure 1) includes a central tubular passageway 46 surrounded by an annular chamber 47 with which the duct 30 communicates adjacent its upper end. The chamber 47 is closed at its upper and lower ends but is provided with an outlet flue duct 48 leading from its lower end diametrically opposite the duct 30. Below the tubular portion 46 and chamber 47, the member 28 is provided with an inlet chamber 49 for cold air, this chamber communicating with tube 46 and being provided with large inlet openings 50 in its sidewall. The lower end of chamber 49 is closed by a plate 51 which has a removable closure section 52. It will be noted that the member 28 is disposed on the base plate 25 in surrounding relationship to an opening 53 formed therein and is suitably welded to the plate. Below the chamber 49 and below the base plate 25 a cold air or plenum chamber 54 is provided in the base 2. This cold air chamber is formed by the horizontal plate 9 previously mentioned and by transversely extending vertical plates 55 which extend between the channels 8. The chamber 54 is also provided with openings 54*a* on both sides to take standard sheet metal pipes for cold air ducts. These openings are adapted to receive ducts for connecting them to a remote space or merely open the plenum chamber directly to the surrounding space in which the furnace is disposed. Openings 54*a* may also be provided in channels 8 at points opposite the burner 32 and valve 60 to permit access thereto.

It will be noted from Figures 1 and 4 that the lower edges of the liners 15 and 16 at the end adjacent the flue duct 48 are notched as indicated at 56 so that the duct will be straddled by the lower portion of the liners. This permits positioning of the liner unit 3 in the casing 1 after the unit 4 is in position therein. It will be noted also that the lower edge of the inner liner 15 will be spaced above the plate 25 of the unit 4 when the unit 3 is in its final position and that the lower edge of the outer liner 16 is spaced above the lower edge of the inner liner.

The flue duct 48 of the unit 4 is adapted to be inserted in an opening 57 formed in the outer casing 1 as shown best in Figures 1 and 4. Surrounding this opening and attached to the outer surface of the casing 1 by screws 58 is a coupling collar 59. However this collar 59 is not attached to the casing until after it is inserted in the hole in the floor.

As shown best in Figure 4, the base plate 25 of the unit 4 has attached to its lower surface the oil supply valve 60. This valve is controlled by a rod 61 which will extend up to the top of the furnace through one of the brackets 20. The valve is connected by a line 62 to the burner 32 and is connected by a line 63 to a source of supply. The line 63 is provided with a coupling 64 which is the only connection that need be disturbed when the unit 4 is to be removed. The valve 60 is also automatically controlled by means of a thermo-bulb 65 which is disposed in a central tubular passageway 46 of member 28, as shown best in Figure 4. This bulb is connected by a tube 66 to valve 60 and will serve to shut off the valve in the usual way upon overheating of the furnace.

The upstanding flanges of the angle members 12 of the base 2, as previously indicated, are spaced apart sufficiently to permit longitudinal movement of the plate 25 of unit 4 relative to the base. Furthermore, the horizontal flanges 12*a* of members 12 are sufficiently wide to permit this movement while still supporting the plate 25. To limit the movement in the direction towards the end of the furnace where the flue is disposed, a stop 67 is attached by bolts 14 or welded to the flange 12*a* of the one member 12 as shown in Figures 4, 5, and 6. The base 2, described previously, includes a pair of longitudinally extending plates 69 which are disposed beneath the channels 8 on opposite sides of the furnace and are secured thereto by removable bolts 70.

In installing the furnace, the casing is slipped downwardly through the receiving opening in the floor. It will be understood that during positioning of the casing in the opening, the units 3 and 4 are preferably removed. When the casing 1 is finally positioned in the floor, the collar 59 is attached to the outer surface of the casing (Figures 3 and 5). Next the unit 4 is passed downwardly into the casing until the plate 25 rests on the flanges 12*a* of angle members 12 (Figures 3 and 5). The unit 4 is then moved longitudinally to pass the end of duct 48 into the collar 59 (Figures 2 and 6). The next step is to position the liner unit 3 in the casing and finally position the grille 6 on the upper end of the casing (Figure 1). The only connection which must be made to the unit 4 is the connection made at the fuel line coupling 64 (Figure 4).

To remove the unit 4 for servicing and cleaning, it is merely necessary to first remove the grille 6 and then the liner unit 3. Next the unit 4 is shifted away from the flue end of the furnace by sliding the plate 25 on the supports 12. As indicated by a comparison of Figures 5 and 6, this permits the unit 4 to be shifted sufficiently to withdraw the flue duct 48 from the flue opening in the casing. Then the unit 4 can be lifted from the casing for cleaning and servicing. The fuel line 63 is disconnected at the coupling 64 before removal of the unit 4. The unit 4 may be repositioned in the casing with ease by resting the plate 25 on the supports 12 and then shifting the unit 4 towards the end of the furnace having the flue connection and it will be obvious from Figures 2 and 3 that base plate 25 will cooperate with the adjacent side walls of the casing to locate the unit 4 laterally in the casing and to guide the horizontal movement of the unit 4, the duct 48 passing through the flue opening in the casing 1 and into the collar 59, sufficient movement being permitted for this purpose without having the lower extending burner unit of member 27 strike the vertical plate 55.

In normal operation of the furnace, cold air passes down through the chamber 22 and then upwardly around the members 27 and 28 and out through the grille 6. Some air also passes upwardly through the passageways 17 which also function as insulating chambers.

It will be apparent from the above description that I have provided a furnace having many desirable characteristics. A number of these char-

acteristics have been mentioned and others 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, and a support having a horizontally disposed supporting surface at the lower end of said casing for supporting said heating unit and upon which said unit slidably rests with its flue connection extending axially in the same direction as said adapter collar so that said 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 support serving to support the heating unit with said flue connection at a level corresponding to the level of said adapter collar, said flue connection being of a size relative to said adapter collar to telescope snugly therewith so that only relative axial movement therebetween is permitted.

2. A floor furnace according to claim 1 including a locating and guiding member carried by said unit for cooperating with the side walls of said casing for locating the unit laterally of the

casing and for guiding the horizontal movement of said heating unit on said support to aid in aligning said flue connection laterally with said adapter collar.

3. A floor furnace according to claim 2 wherein said locating and guiding member comprises a base plate for supporting said heating unit and said support comprises a base attached to said casing.

4. A floor furnace according to claim 3 wherein said support is provided with stop means with which said base plate engages to limit horizontal movement of said heating unit on the base towards the wall of the casing which carries said adapter collar.

5. A furnace according to claim 4 wherein the heating unit comprises a combustion chamber and a heat radiator connected together as a single unit by means including a permanent duct connection between the two.

6. A furnace according to claim 5 wherein the combustion chamber has a downwardly projecting extension and the base is provided with a space for receiving said extension and for permitting horizontal movement thereof with said unit.

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