

Sept. 13, 1932.

A. E. MUNKEL

1,877,421

HEATING APPARATUS

Filed April 22, 1930

4 Sheets-Sheet 1

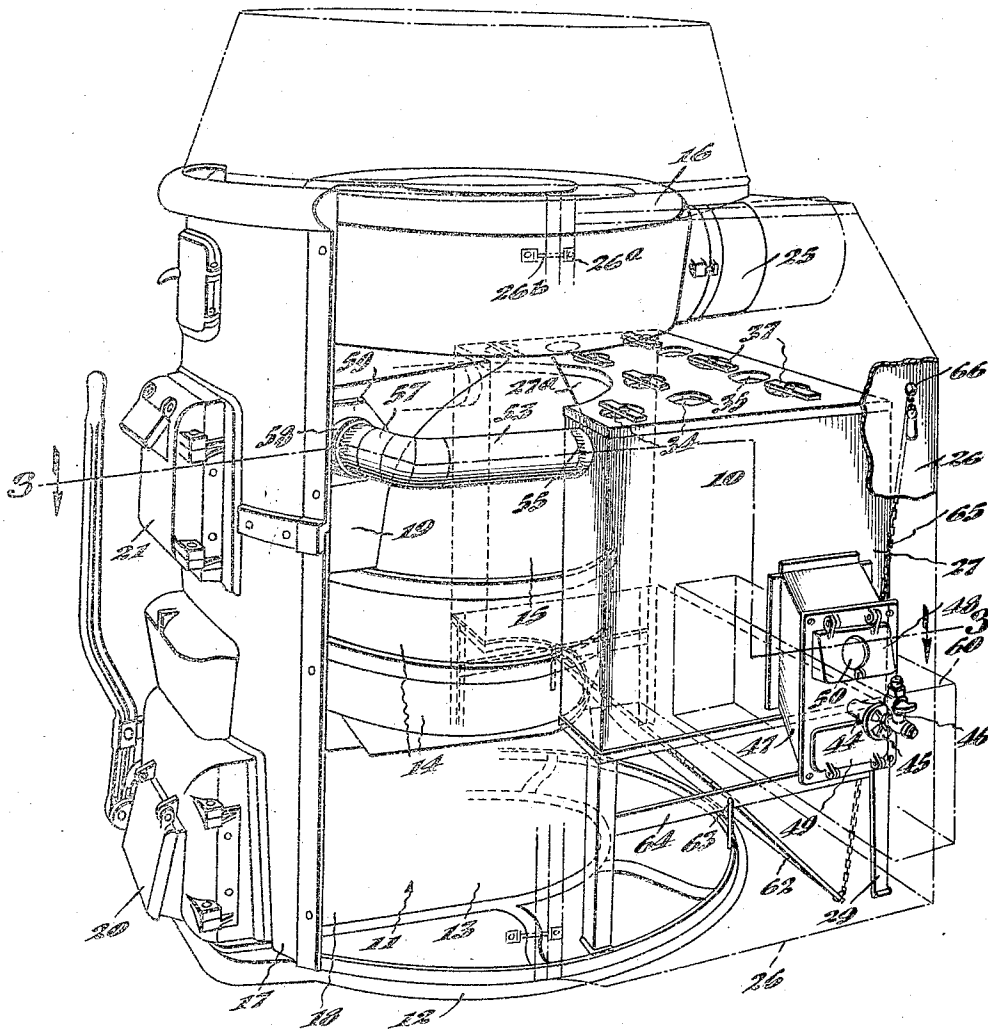


Fig. 1.

INVENTOR

Adolph E. Munkel

BY

Worck & Wood

ATTORNEYS

Sept. 13, 1932.

A. E. MUNKEL

1,877,421

HEATING APPARATUS

Filed April 22, 1930

4 Sheets-Sheet 2

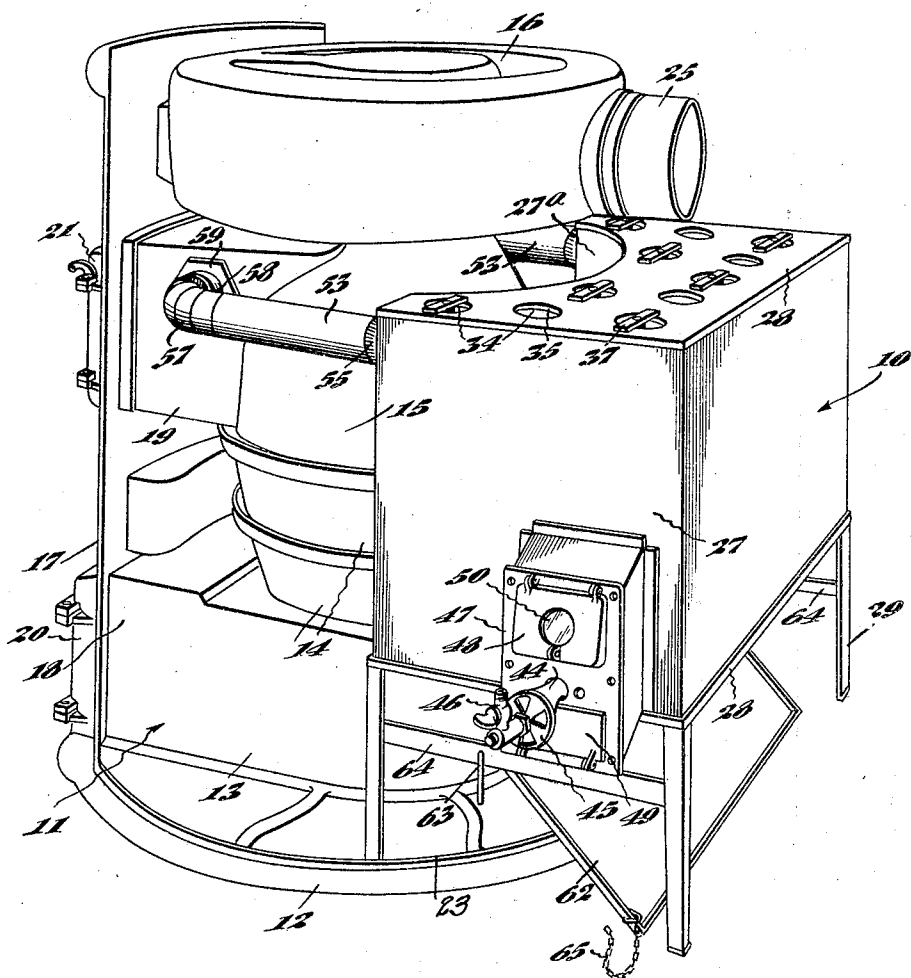


Fig. 2.

INVENTOR

Adolph E. Munkel

BY

Wood & Wood

ATTORNEYS

Sept. 13, 1932.

A. E. MUNKEL

1,877,421

HEATING APPARATUS

Filed April 22, 1930

4 Sheets-Sheet 3

Fig. 3.

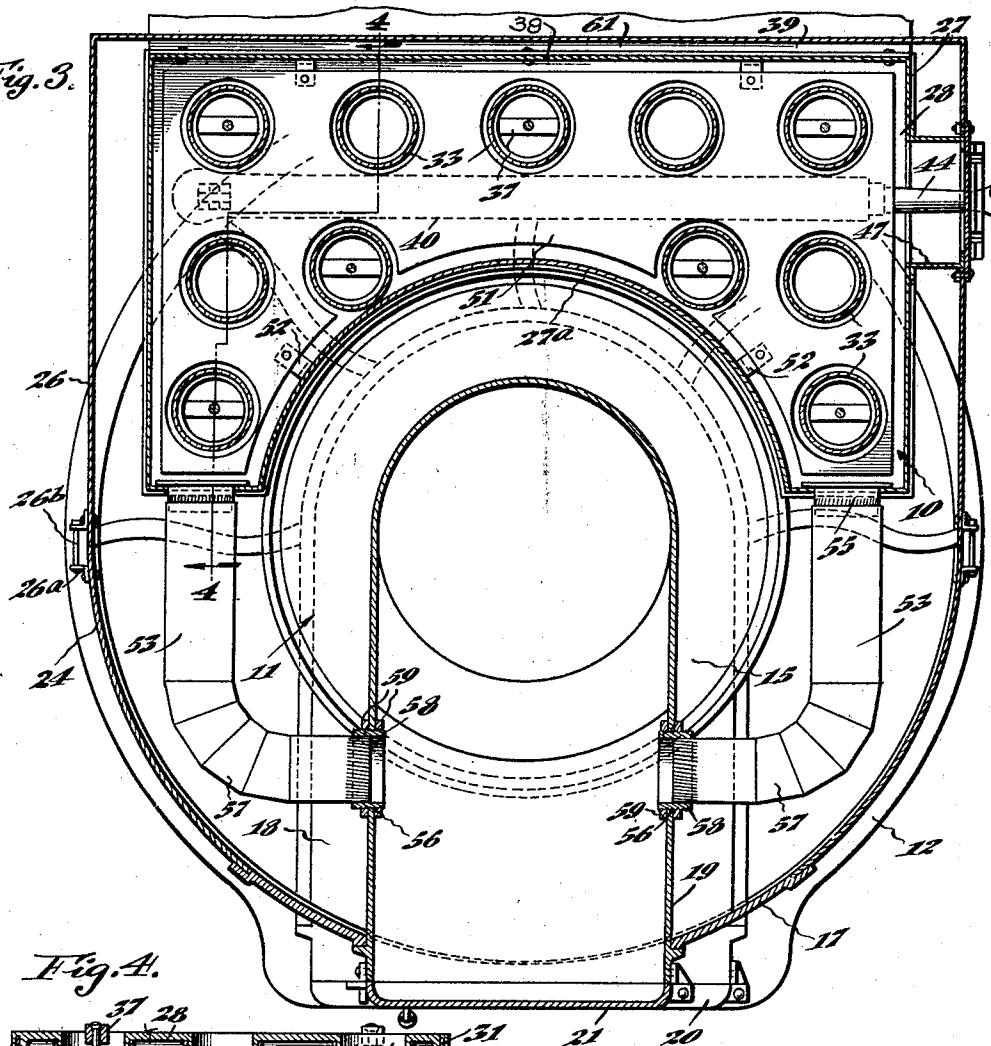
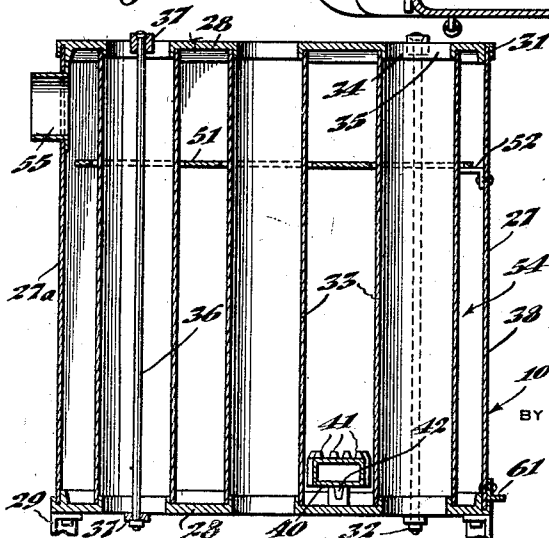


Fig. 4.



INVENTOR

Adolph E. Munkel

BY

Wood & Wood

ATTORNEYS

Sept. 13, 1932.

A. E. MUNKEL

1,877,421

HEATING APPARATUS

Filed April 22, 1930

4 Sheets-Sheet 4

Fig. 5.

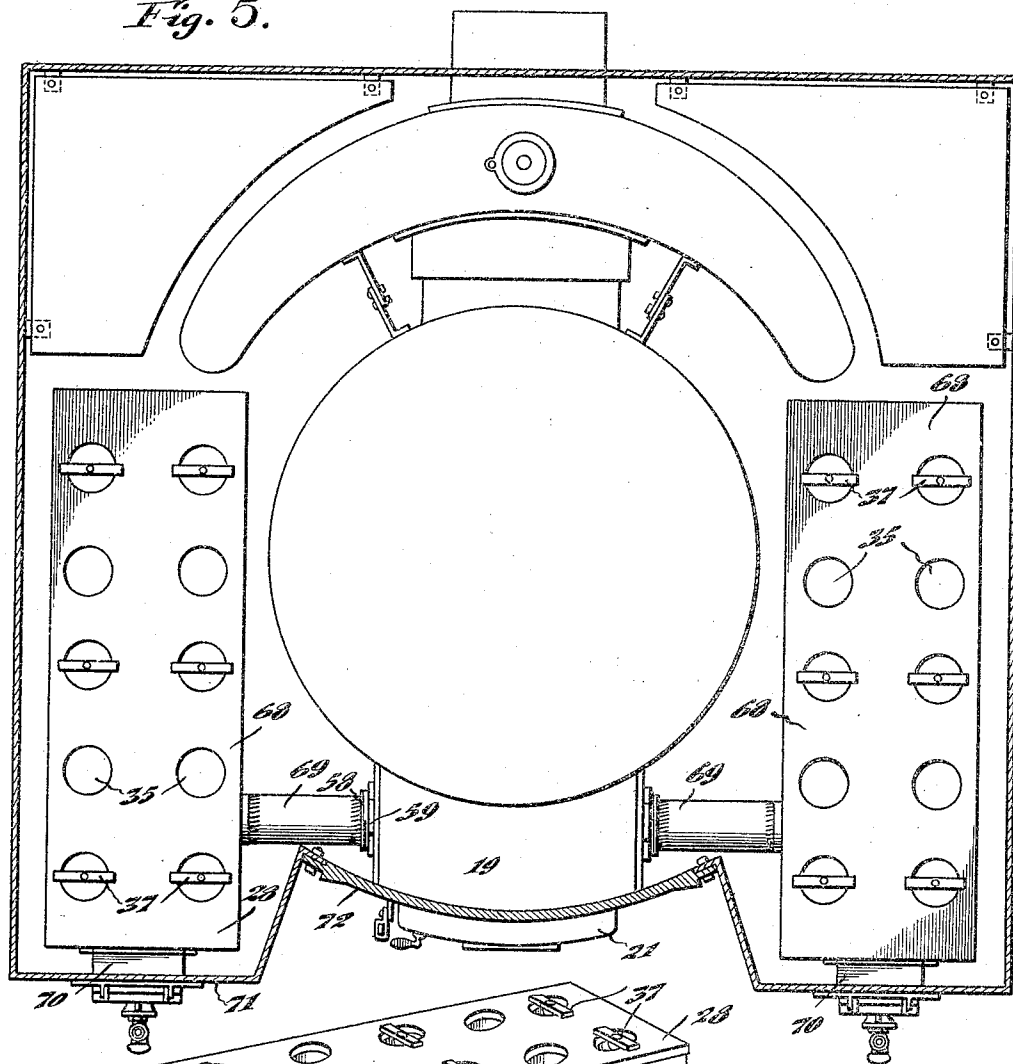
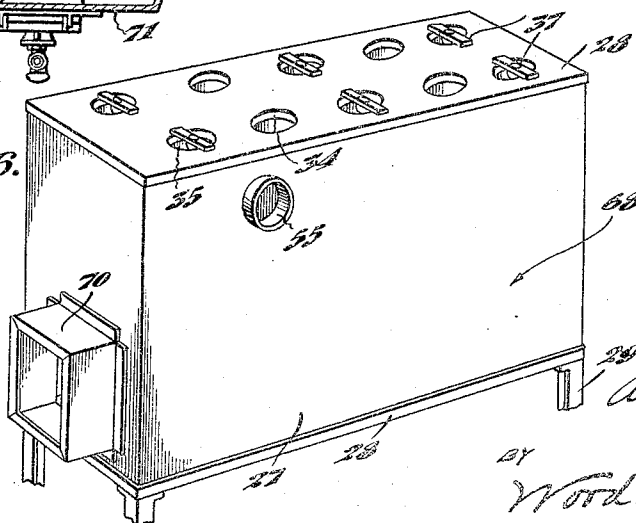


Fig. 6.



INVENTOR

Adolph E. Munkel

BY

Wood & Wood

ATTORNEYS

UNITED STATES PATENT OFFICE

ADOLPH E. MUNKEL, OF COLUMBUS, OHIO

HEATING APPARATUS

Application filed April 22, 1930. Serial No. 446,229.

This invention relates to heating apparatus and is particularly directed to a gas attachment or heater adapted to be used in combination with a coal burning furnace. This gas heater has application to a previously installed coal burning furnace or can be sold and installed in combination with the coal furnace.

Heretofore when the gas heater was being used, the coal furnace was entirely unheated and constituted a dead heat radiating area. It is therefore an object of this invention to provide a heating apparatus including a gas heater in which not only is an extremely great heat radiating area provided in the gas heater but which gas heater also by means of connections between the respective combustion chambers makes use of the entire radiating surface of the coal burning furnace. By this arrangement it is provided that the heat which ordinarily passes out through the fume vent of the gas heater and is wasted, is directed through the combustion chamber of the coal burning furnace and thence out through the smoke pipe of the aforesaid furnace. Due to the length of travel of the heat and the consequent increased contact with heat radiating surfaces, the present apparatus achieves the greatest possible efficiency.

It is another object of this invention to provide a gas heater for use in combination with a coal burning furnace which is extremely easy to install and requires very little alteration of the coal furnace to which it is applied.

It is another object of this invention to provide an adjustable baffle or plate for directing the return fresh air coming in through the cold air duct either through the gas heater or for deflecting it away from the gas attachment into the region of the coal burning furnace. This baffle, therefore, functions to prevent the passage of cold air through the gas attachment from whence it might proceed to the rooms of the house in unheated condition.

Another object of this invention is to provide a gas heater which in itself has an extremely great area of heat radiating surface.

Other objects relate to the general construction of the gas heater and to the arrangement of the gas burner relative to the heating surfaces as well as the connection of the connecting conduits or flues extending from the gas heater to the coal burning furnace whereby these flues are quickly attached to the coal burning furnace.

Further objects and certain advantages will be more fully apparent from the description of the accompanying drawings, in which:

Figure 1 is a perspective view looking toward the forward corner of the combined gas heater and coal furnace and illustrating the casing which surrounds this apparatus in dot and dash lines.

Figure 2 is a perspective view of the heating apparatus showing it in relation to a coal burning furnace, the view looking toward a rear corner of the heating apparatus and showing the apparatus uncased.

Figure 3 is a sectional view taken on line 3—3, Figure 1 detailing the interior of the gas heater and showing the connection of its combustion chamber with the combustion chamber of the coal furnace.

Figure 4 is a sectional view taken on line 4—4, Figure 3, further detailing the interior of the gas heater.

Figure 5 is a top plan view of a modified combination of gas attachments and coal furnace illustrating two gas furnace heaters arranged, one at each side of the coal furnace.

Figure 6 is a perspective view of one of the gas attachments used in the double arrangement shown in Figure 5.

The gas burning heater unit or attachment 10, as applied to a standard coal furnace 11 is shown in Figures 1 to 4 inclusive, of the drawings. This conventional coal furnace,

comprises, a base plate 12, an ash pit casing 13, a plurality of fire pots or bowls 14—14, a combustion chamber casing 15, and a radiator 16, these elements being mounted one upon the other in the order described. A front plate 17, is bolted to the snout 18 of the ash pit casing 13 and the feed snout 19 of the combustion casing chamber 15, this plate having mounted thereon the respective doors 20, 21, for the ash pit and the combustion chamber.

The shape of this type of furnace is generally circular and the base plate 12 includes a circular flange 23 mounting the lower end of the circular casing 24 enclosing the aforesaid furnace elements. This casing 24 is formed of sheet metal and surrounds the heating elements being attached to the respective sides of the front plate. A flue or smoke discharge snout 25 extends from the rear of the radiator.

The gas burning heater unit is mounted at the rear of the coal burning furnace after the casing thereof has been removed (in those instances of installation where the coal furnace has been previously installed). A casing 26 is provided with the gas heater for connection to the cut-away coal furnace casing and it is therefore a very simple operation to reconstruct the casing to properly surround the combined gas burning heater and the coal furnace.

The gas burning furnace is constructed of sheet metal plates 27 forming side walls clamped between upper and lower cast plates 28—28. The inner wall 27^a of the gas burner casing has a horizontally arcuate portion to clear the circular fire bowl and combustion chamber of the furnace, this enabling the installation of the gas burner relatively close to the coal furnace and thereby necessitating very little additional space at the rear of the furnace.

The cabinet structure, as described is mounted on four legs 29, one at each corner of its rectangular lower plate. The upper and lower plates include grooves 31 around their margins and the upper and lower edges of the side plates are disposed in the grooves 31.

Radiator tubes 33 are disposed within the heater casing between the upper and lower plates, these tubes nesting over circular flanges 34 formed in the respective plates, which flanges are marginally disposed around openings 35 in the respective plates. The entire structure is held together by means of draw bolts or tie rods 36 extending through the tubes and having lugs 37 attached to the respective ends of the rods and lying diametrically across and upon the margins of the openings in the upper and lower plates. The rods are headed at their upper ends and their lower ends are screw threaded. The

correct drawing tension between the lugs is applied by means of nuts 32, one on the lower screw threaded end of each rod. This unit is set up directly behind the furnace and has forward legs disposed on the inside of the ring portion of the base for the coal furnace.

A particular width for the gas burner furnace is selected so that the side walls of the added casing 26 of the gas furnace, when attached to the furnace casing, extend tangentially from diametrically opposite sides of the coal furnace casing parallel with the side walls of the gas heater and spaced therefrom to a rear wall 38 of the casing, which rear wall is set up with a slight clearance indicated at 39 between it and the gas furnace. The respective casings 24 and 26 are connected at their abutting edges by means of a series of clips 26^a on each margin of each casing. Adjoining clips are drawn together by means of draw bolts 26^b to snugly abut the edges of the casings.

A gas burner 40 is mounted within the combustion chamber of the gas furnace extending between the tubes thereof. This burner is rectangular in cross section and is hollow, the gas flowing therefrom through a row of gas jets 41 extending around the margin of the burner on the upper side thereof. The gas burner is supported on the lower plate having ribs 42 formed thereon one at each end thereof on the underside, these ribs fitting in seats cast at each end of the lower plate. The seats each consist of a U-shaped lug 42 extending upwardly from the plate. The burner lugs or ribs 42 are inserted and rest between the arms of the respective lugs of the plate.

A gas pipe 44 enters one end of the gas burner being screw threaded into the same. An appropriate air mixture means 45 and control valve 46 may be provided in the gas pipe line outside the gas heater. At the point where this gas pipe enters the furnace, a door frame 47 is mounted on the side plate of the gas furnace, this door frame having upper and lower doors 48 and 49 respectively hinged thereto. The lower door 49 is below the outwardly extending gas line and controls the air inlet for supplying air to the combustion chamber and gas burner. It will be understood that this door must be open to permit combustion in the chamber. The upper door 48 is of general utility and includes a sight opening 50 so that the condition of the gas flame may be observed.

Toward the upper end of the interior of the gas attachment a horizontal baffle plate 51 is mounted on angle iron rack lugs 52. The pipes or radiator tubes extend through openings in this baffle of considerably greater diameter for causing the products of combustion to move upwardly adjacent the pipes for greater radiation and to be slightly re-

tarded so as to be fully effective in heating the radiator area. There is also a clearance between the edges of the baffle and the walls of the heater casing compelling flow of heat adjacent the walls for greater radiation.

The fume inlet or discharge conduit for the products of combustion ordinarily leads from the gas furnace to the atmosphere. In this instance, conduits 53, 53 extend from the combustion chamber 54 of the gas furnace to the combustion chamber of the coal furnace. A sleeve 55 is attached at each side of the gas furnace to the front plate thereof as far up on the plate as possible and above the baffle. The conduits 53, 53 extend from these fittings toward the front of the coal furnace and elbows 57 thereof extend the conduits inwardly toward the feed snout. The connection of these conduits to the feed snout is of the following construction. The openings to which the conduits are connected must be cut in the cast iron snout of the combustion chamber of the coal furnace. An opening 56 slightly larger than the size of the pipe is cut into each side of the feed snout. This cutting is done by means of a special tool provided for the installation of these gas heaters. It will be apparent that these openings could be cast in the furnace if desired but the foregoing applies to the conventional coal furnace.

Exteriorly screw threaded sleeves 58, 58 are inserted in these openings and the inwardly disposed ends of the elbows are inserted in these sleeves. A pair of lock nuts 59, 59 on each sleeve complete the attachment. In each connection there is a lock nut on the inside and one on the outside firmly clamping the sleeve to the wall of the feed snout. From this connection the products of combustion and fumes pass through the combustion chamber and radiator of the coal furnace and then are discharged into the flue of the chimney by way of the conventional smoke pipe.

The fresh air intake 60 for the furnace is toward the rear thereof just below the gas heater casing, there being a stub extending from the outer casing of the combined furnaces to which a cold air conduit may be attached, if the cellar air is not desired. From this intake opening the fresh air passes upwardly through the tubes of and around the casing of the gas heater, about the feed section and radiator of the hot air furnace, being heated by contact with all these respective parts, and thence moves into the hot air pipes of the furnace to the respective rooms.

A certain space between the rear wall of the gas heater cabinet and the outside casing of the combined furnaces is converted into a dead air space by the insertion of a baffle 61 in the form of a strip of angle iron along the

lower rear edge of the cabinet. It has been found that, the rear wall of the gas furnace being adjacent the rear wall casing of the furnaces, some radiation takes place from the outer casing 26 thus lessening the efficiency of the furnace. By deadening this space, it is possible to prevent this loss and to make use of this radiation at other points.

For the purpose of efficient flow of incoming air either to the gas heater or to the coal furnace, a movable baffle plate 62 of the following nature is included. This plate is hinged along its inner margin on a rod 63 mounted in end rails 64—64 attached between the legs of the gas heater. The hinge point for this baffle plate is slightly below the undersurface of the cabinet and the baffle is of lesser area than the area of the floor of the casing.

When the gas heater is in use and this baffle is down or positioned as shown in Figure 1, the incoming air is deflected into the tubes of the gas furnace and circulates through the tubes to pass in heated condition into the heat discharge pipes extending to the rooms of the house. The baffle causes the major part of the incoming air to pass through the radiator tubes and the remainder to flow upwardly about the gas heater casing. It is desirable to prevent circulation of the incoming air around the cold lower region of the coal furnace. After the air moves above the gas heater, additional heating is accomplished through contact with the radiator and combustion chamber of the coal furnace.

When the coal furnace is being used, the baffle is drawn up to cause its rear end to engage the underside of the cabinet. This is accomplished by means of a chain 65 attached at one end to the rear end of the baffle and having a handle on its other end. This chain passes through a notch 66 in the casing 26. This notch is V-shaped and tends to maintain the chain in fixed position unless the chain is raised and disengaged therefrom. When the baffle is in upper position the result is to deflect the air into the region of the coal furnace and to block the entry of the incoming cold air through the tubes of the gas furnace.

In Figures 5 and 6, a dual form of installation is illustrated. In this case the gas units are similar to the previously described gas heater unit with the exception that they do not have the arcuate wall. They are of definite rectangular cross section and are mounted one at each side of the coal burning furnace. Each of these units 68 has a flue or discharge conduit 69 for the products of combustion respectively entering opposite sides of the feed snout of the coal furnace. The door frames 70 at the front ends of the respective units protrude through and are mounted in a sheet metal forward wall 71 of the furnace. This sheet metal wall has a depressed central portion to which the main

door frame plate 72 of the coal furnace is attached.

The combination of the gas heater with the conventional coal furnace has made an extremely effective heating apparatus in the present instance. When the gas heater is being operated not only is a very large heat radiating area being used in the gas heater but the extremely large heat area of the coal furnace is additionally utilized. All the extra radiation resulting from the conduit connection between the combustion chamber of the respective heating devices is made use of without additional cost in the operation of the apparatus for the reason that the products of combustion from the gas heater are ordinarily directed immediately to the flue after they have passed through the gas heater and a great deal of heat loss occurs. The present construction merely makes use of the heat being discharged beyond the gas heater.

The use of the gas heater combined with the coal furnace does not detract from the efficiency of the coal furnace when the gas heater is not being used for the reason that, at this time, the baffle arrangement effectively prevents the passage of cold air by way of the gas heater to the heat discharge pipes of the furnace.

Having described my invention, I claim:

1. In a gas heater unit, a casing constituting a combustion chamber, radiator tubes extending through said casing and providing passageways entirely therethrough, a gas burner disposed in the combustion chamber and extending between the tubes, a baffle located across the interior of said combustion chamber above said burner, said baffle having clearance openings through which said tubes extend for causing a retarded flow of the products of combustion around all the tubes and means for exhausting the combustion chamber above the baffle.

2. A heating appliance, comprising, a casing constituting a combustion chamber, means for supporting said casing, a plurality of radiator tubes extending between the top and bottom walls of said casing, the top and bottom walls of the casing having openings therein registering with said tubes, a baffle plate disposed in the upper interior of the casing transversely of said tubes, said baffle cut away to provide clearance about said tubes and about the walls of said casing for causing heat travel close to the tubes and wall, and means for exhausting the products of combustion from said casing.

3. In a heating apparatus, a coal burning furnace, a gas heater, including air heating passageways, mounted at the rear of the coal furnace, a casing enclosing said coal furnace and gas heater having a fresh air inlet opening located beneath the gas heater, and an adjustable baffle for directing the incoming air either through the air heating passage-

ways of the gas heater or into the region of the coal burning furnace as desired.

4. In a heating apparatus, a coal burning furnace, a casing enclosing said coal furnace having a fresh air inlet opening toward the base thereof, a gas heater casing having an arcuate forward wall adapted to be disposed about the coal furnace within said casing, a plurality of radiator tubes extending vertically through said casing, a gas burning element disposed between said tubes, and a plate disposed at the underside of the gas heater casing for directing or baffling the air flow upwardly through the tubes.

5. A heating apparatus, comprising, a coal furnace, a gas heater casing located at the rear of said coal furnace and having an arcuate forward wall encircling the rear portion of the coal furnace, conduits extending from the upper end of said gas heater casing and providing free flow of the heat from the gas heater to the coal furnace for additional radiation from the radiating surfaces of the coal furnace, said conduits connected to the combustion chamber of the coal furnace, a casing surrounding both the coal furnace and the gas heater casing, said outer casing having a fresh air intake opening at the rear of the furnace beneath the gas heater casing, said gas heater casing including air heating passageways disposed upwardly therethrough, and means for selectively controlling the fresh air either through the air heating passageways of the gas heater casing or to the coal furnace.

6. A heating apparatus, comprising, a coal burning furnace, a gas appliance mounted at the rear of said coal burning furnace, said appliance having a casing including a forward wall of arcuate form for encircling the rear of the coal furnace, a casing surrounding said coal furnace and gas appliance, and a baffle plate extended between the lower rear edge of the gas appliance casing and the rear wall of the main casing of the furnace for preventing the upward passage of air through the space between the rear wall of the gas appliance casing and the rear wall of the main casing of the furnace thereby preventing loss of heat through the rear wall of the main casing.

7. In a heating apparatus, a coal burning furnace, a gas heater mounted adjacent said furnace and including vertically disposed air passageways therethrough, a main casing surrounding said coal burning furnace and said gas heater and including a fresh air inlet opening toward its base, and supporting means for said gas heater for positioning the same at an elevation above the fresh air intake, whereby the fresh air may pass upwardly through said gas heater and to the coal burning furnace.

8. A heating apparatus, comprising, a coal burning furnace, a gas heater disposed at

each side of said coal burning furnace including vertically disposed air passageways therethrough, a casing surrounding said coal burning furnace and said gas heaters including a fresh air inlet, and supporting means for said gas heaters, whereby the fresh air may pass under the same and upwardly therethrough and to the coal burning furnace.

10 In witness whereof, I hereunto subscribe my name.

ADOLPH E. MUNKEL.

15

20

25

30

35

40

45

50

55

60

65