Feb. 15, 1966 R. R. HODGES 3,234,930

BASEBOARD GAS HEATER

Filed Sept. 30, 1963 5 Sheets-Sheet 1

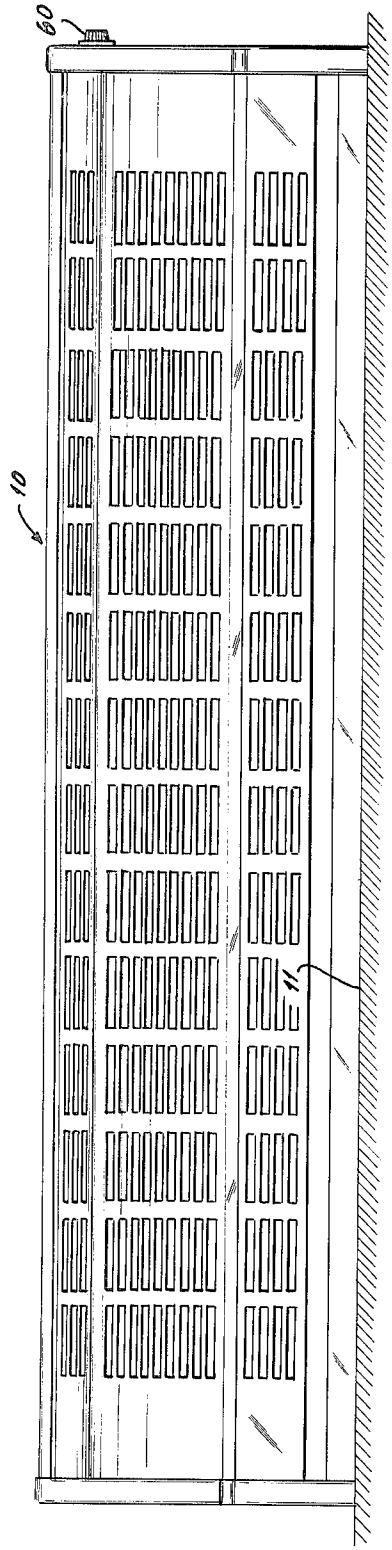


FIG. 1

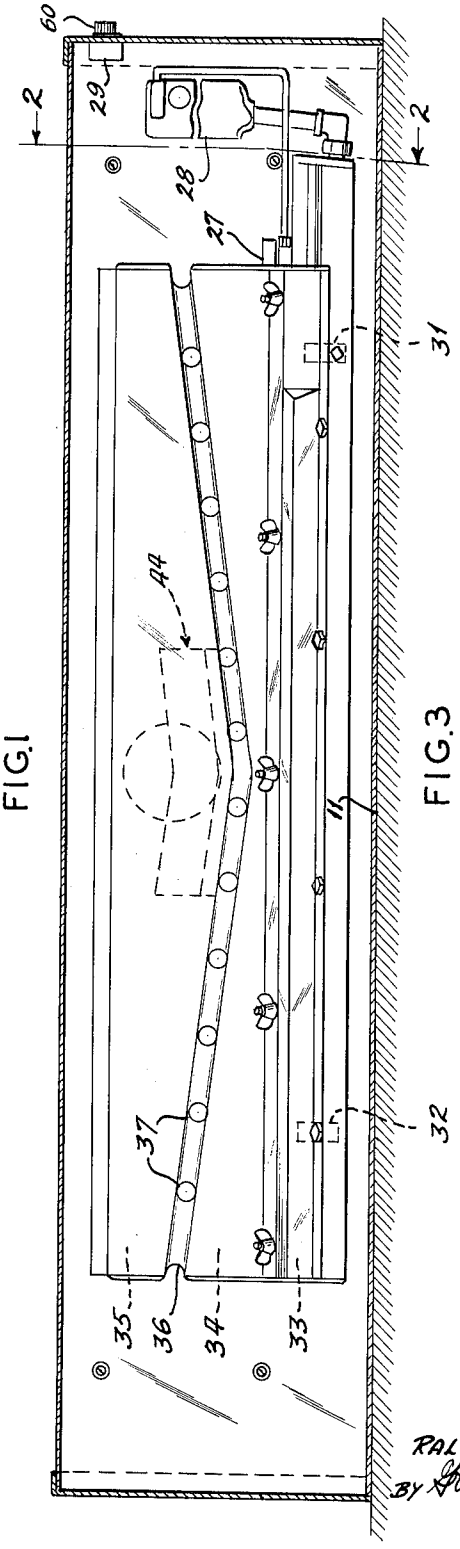


FIG. 3

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BASEBOARD GAS HEATER

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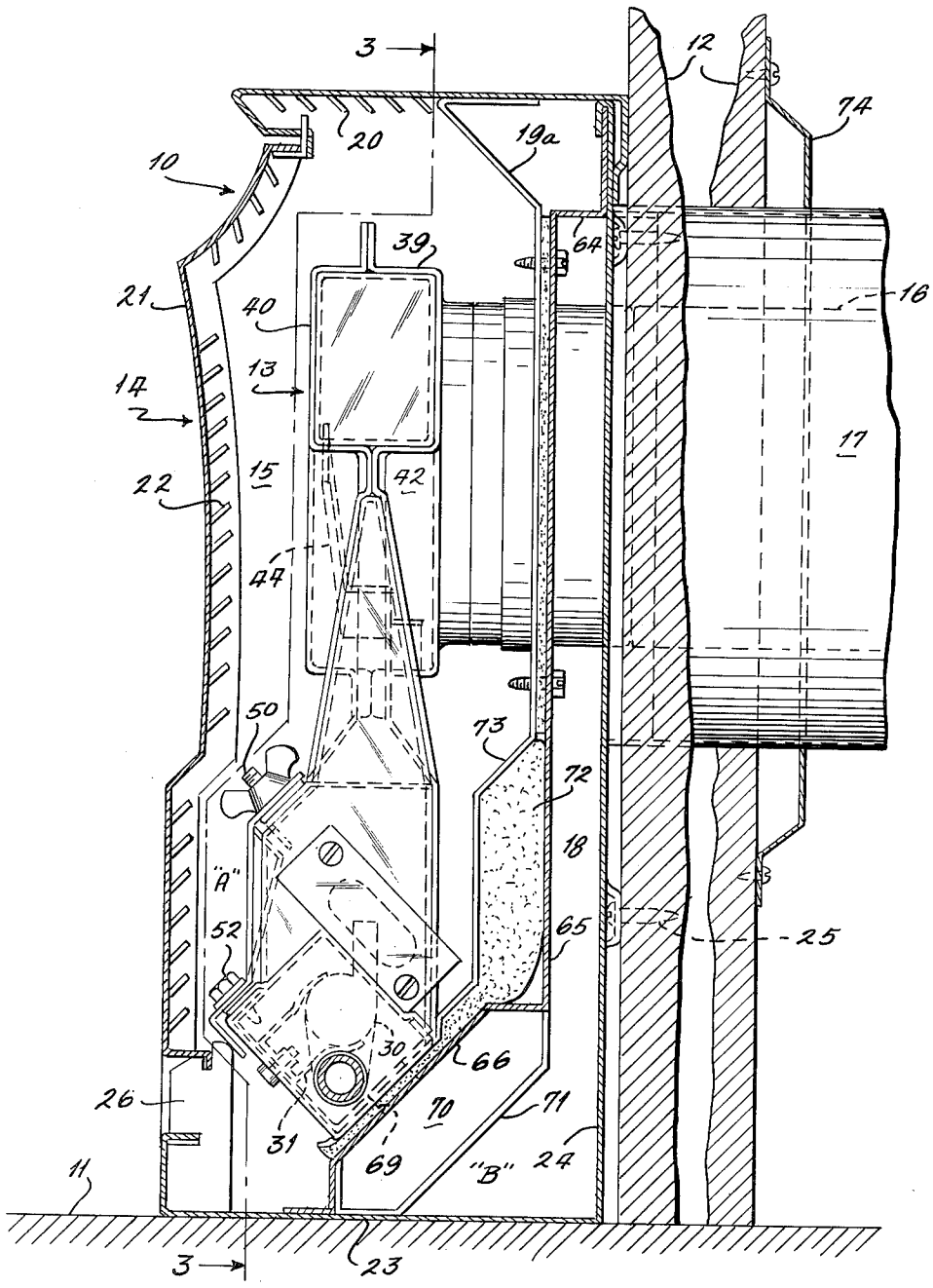


FIG. 2

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BASEBOARD GAS HEATER

Filed Sept. 30, 1963 5 Sheets-Sheet 3

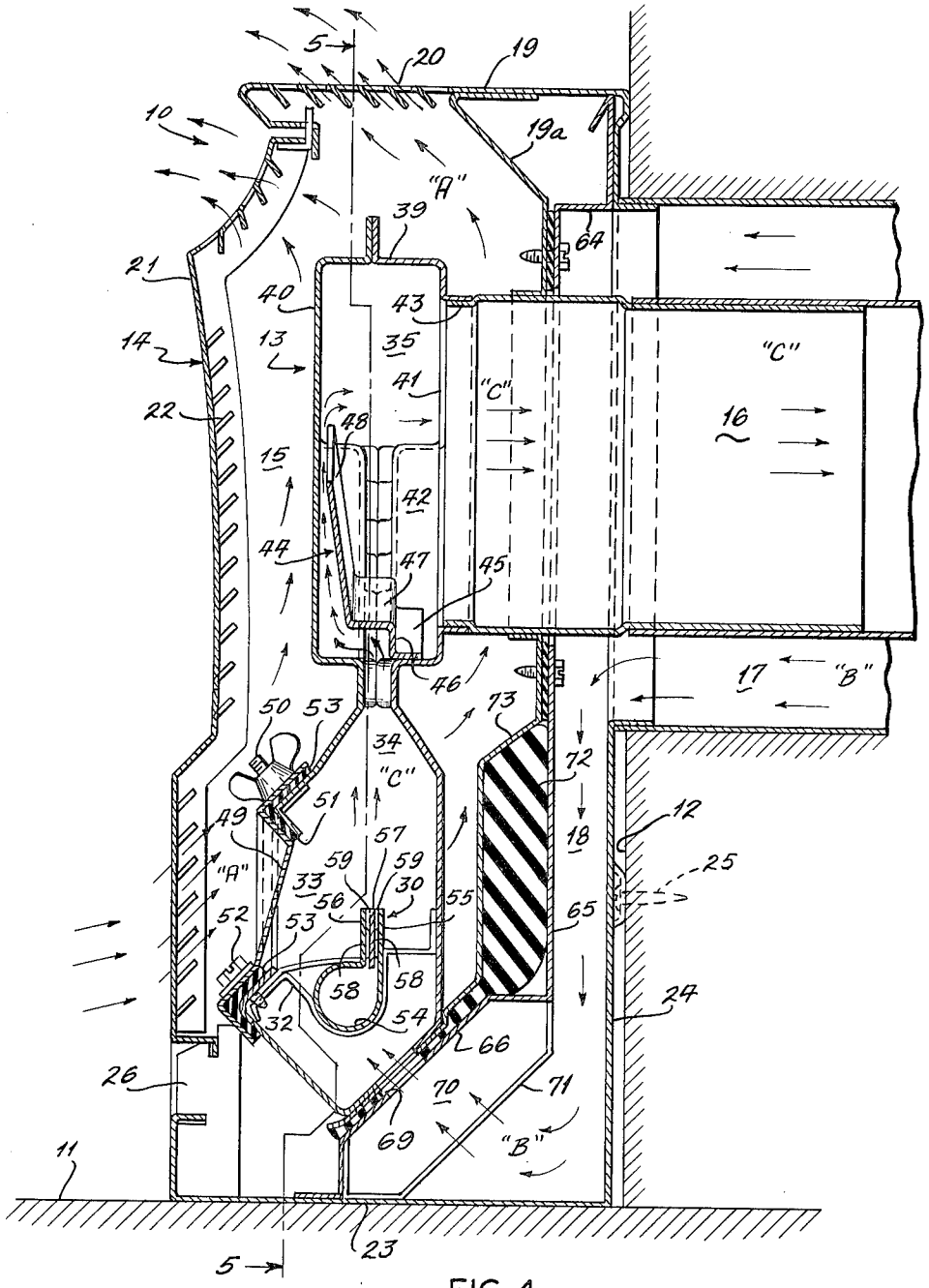


FIG. 4

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BASEBOARD GAS HEATER

Filed Sept. 30, 1963 5 Sheets-Sheet 4

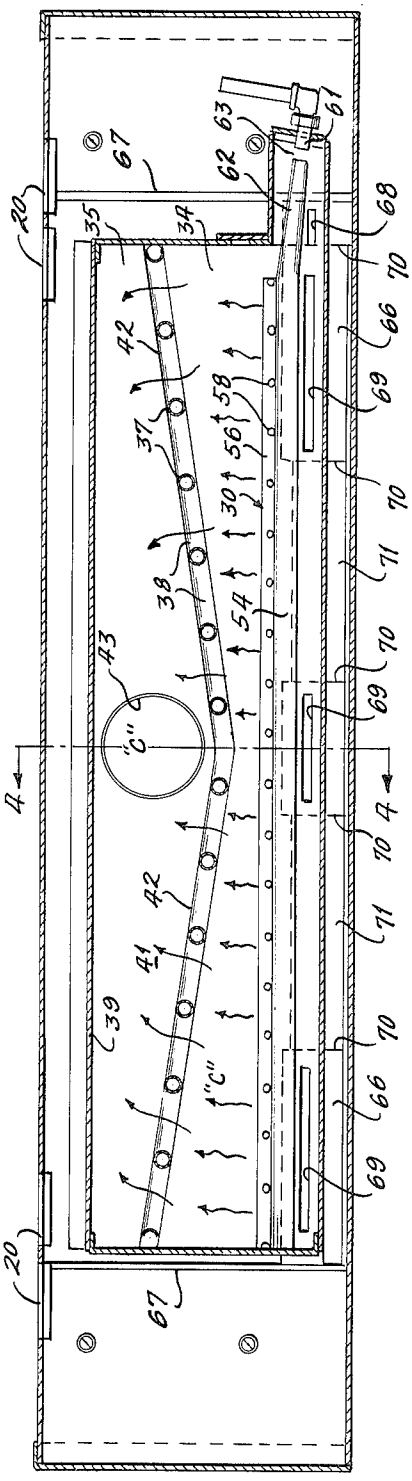


FIG. 5

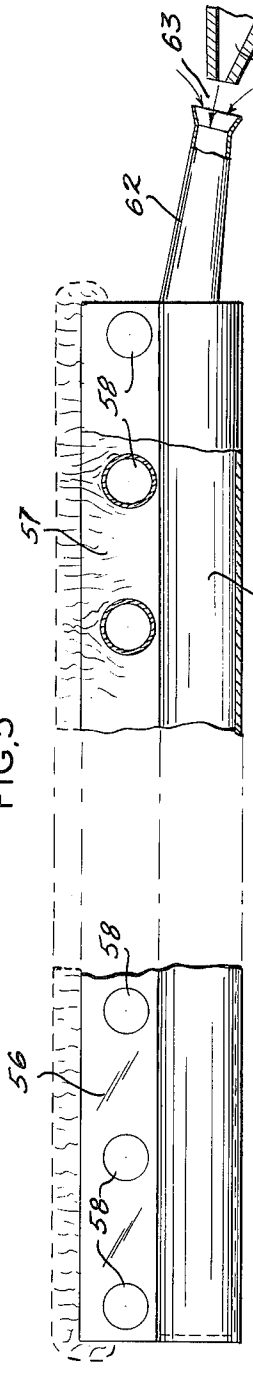


FIG. 7

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BASEBOARD GAS HEATER

Filed Sept. 30, 1963 5 Sheets-Sheet 5

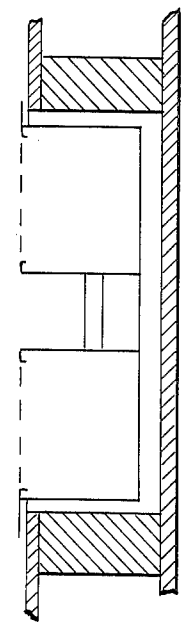


FIG.10

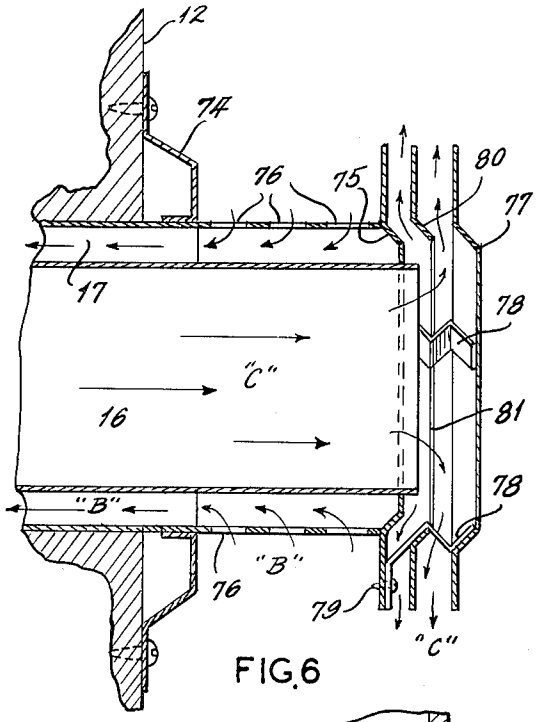


FIG.6

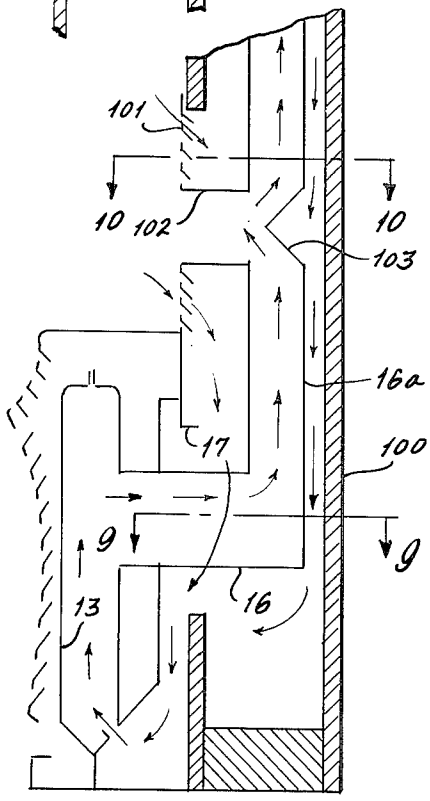


FIG.8

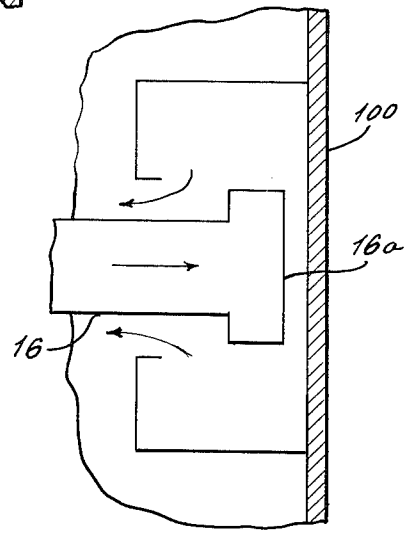


FIG.9

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United States Patent Office 3,234,930 Patented Feb. 15, 1966

3,234,930

BASEBOARD GAS HEATER

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Filed Sept. 30, 1963, Ser. No. 312,474
7 Claims. (Cl. 126—90)

The present invention relates to baseboard heaters and specifically pertains to gas-fired sealed baseboard heaters.

It has long been desired in the gas burning heater industry to provide a gas-fired baseboard heater, but heretofore such heaters have not been commercially available, primarily due to the difficulty of maintaining the required combustion within the heater. In a baseboard heater, the combustion chamber is extremely long relative to its height; whereas in a conventional wall heater the combustion chamber is relatively narrow as compared to its height. Normal gas burners have not been found satisfactory in a baseboard heater, and it has been difficult to maintain the burner ignited in gas-fired baseboard heaters. This defect has limited their commercial availability and usefulness.

Another problem connected with the combustion is the desirability that present-day heaters be of the sealed type wherein the combustion is maintained using only outside air and no room air is burned. The eliminates the possibility that products of combustion can contaminate the room air. Normally, however, outside air is available only by through the wall venting so that a single source of outside air must supply a long combustion chamber for efficient heating operation. This complicates the aforementioned combustion problem.

Therefore, one of the present objects of the present invention is to provide a gas-fired baseboard heater which is efficient and reliable in operation and which is simple and easy to construct and install.

Another object of the present invention is to provide a gas-fired baseboard heater having a sealed combustion system wherein only outside air is burned, and room air is sealed from contamination with the products of combustion.

Another object is to provide a gas-fired baseboard heater which may use room air for combustion, and which is efficient and reliable in operation.

Still another object of the present invention is to provide a gas-fired baseboard heater having a combustion chamber which is relatively long compared to its height and which is of irregular internal configuration to stimulate combustion.

Still another object is to provide a combustion chamber having a centrally located outlet for venting the products of combustion through a room wall, and which incorporates a baffle mounted partially in front of the outlet to reduce direct discharge flow of the products of combustion from the burner, and thereby improve heating efficiency.

A further object of the present invention is to provide a gas-fired baseboard heater having a long burner positioned in the bottom of an irregularly shaped, long, low combustion chamber with secondary air for combustion being provided by a plurality of spaced ducts leading to the burner chamber along the length of the burner.

Still another object of the present invention is to provide a gas-fired baseboard heater having concentric inlet and outlet ducts with the fresh air for combustion being passed from the inlet duct down behind the combustion chamber

to insulate the same from the adjacent room wall with the air being admitted to the combustion chamber in a plurality of locations along the length of the burner.

Another object is to provide a baseboard heater having a removable front wall with a sealed combustion chamber having a removable door to provide access to the burner area.

Another principal object of the present invention is to provide a gas-fired baseboard heater having a combustion chamber which is long relative to its height and having a burner substantially the full inside length of the combustion chamber and having an outer room air heating chamber surrounding the combustion chamber for the purpose of distributing the total heat over a wide area and avoiding concentrated hot spots.

Another object is to provide, in a gas-fired baseboard heater, a long burner with continuous ports running the full length of the top and slightly down each end with embossed spacer connections located sufficiently below the burner top surface to allow a continuous flame along the entire burner length and having a slot cross section and mixer tube so designed and proportioned so that the heater will operate efficiently and ignite quickly and quietly when used with any commercially available gas without customary primary air adjustment means.

A further object of the present invention is to provide a baseboard heater having a foil-lined insulation positioned behind the rear wall of the combustion chamber, between the combustion chamber and the room wall, whereby heat from the combustion chamber is reflected from the foil surface toward the room to be heated.

These and other objects and advantages will become apparent hereinafter.

The present invention comprises a gas-fired baseboard heater having an irregularly shaped combustion chamber with a long burner positioned in the bottom thereof and with spaced combustion air inlet passages to convey outside air to the burner area.

In the drawings wherein like numbers refer to like parts wherever they occur,

FIG. 1 is a front elevational view of the present invention,

FIG. 2 is a sectional view taken along line **2—2** of FIG. 3,

FIG. 3 is a sectional view taken along line **3—3** of FIG. 2,

FIG. 4 is a sectional view taken along line **4—4** of FIG. 5,

FIG. 5 is a sectional view taken along line **5—5** of FIG. 4,

FIG. 6 is a fragmentary view of the cap over the ends of the air intake and products of combustion vents,

FIG. 7 is a fragmentary view of the burner assembly, and

FIGS. 8–10 show a modification of the present invention which uses room air for combustion and the products of combustion are vented through the roof.

The present invention comprises a gas-fired baseboard heater **10** which is positioned on the floor **11** of a room or enclosed space adjacent to an outside room wall **12**. The heater **10** comprises a combustion chamber **13** mounted in a louvered casing **14** which defines a room air heating chamber **15**. The combustion chamber **13** is sealed from contact with room air and is provided with an outlet duct **16** through which the products of combustion are exhausted to the atmosphere through the room wall **12**. An inlet duct **17** is concentric with the outlet duct **16** and

carries fresh air for combustion through the room wall **12** to a fresh air passage **18** positioned at the rear of the heater **10**, and which, in turn, conveys the air to the bottom of the combustion chamber **13**.

The heater casing **14** comprises a top wall **19** provided with louvers **20**, a front wall **21** provided with louvers **22**, a bottom wall **23** positioned adjacent to the floor **11**, and a rear wall **24** positioned adjacent to the room wall **12**. Screws **25** fasten the baseboard heater **10** to the room wall **12**. The front wall **21** is removably fastened to the top wall **19** and to the bottom wall **23** by brackets **26** to provide access to the combustion chamber **13** and to the pilot **27**, gas valves **28**, and thermostat **29**.

The combustion chamber **13** is mounted within the air heating chamber **15** and is sealed throughout, so that the products of combustion do not contaminate the room air. The room air passes through the front wall louvers **22** over and around the combustion chamber **13** (where it is heated) and is emitted through the top wall louvers **20** and at the top of the front wall **21**. This flow is indicated by the arrows "A" in FIG. 4. A baffle **19***a* is positioned at the top edge of the air heating chamber to deflect heated air toward the discharge openings.

The combustion chamber **13** is provided with a burner **30** positioned in the lowermost portion thereof by means of a burner bracket **31** positioned adjacent to one end of the chamber **13** and a burner support **32** positioned adjacent to the other end. The combustion chamber **13** is of unique shape and design to support combustion throughout the length of the burner **30**. The combustion chamber **13** comprises a lowermost burner area **33**, an intermediate portion **34** and an upper portion **35**. The intermediate portion **34** tapers from its juncture with the top of the burner area **33** toward its top, and decreases in height from its ends toward the center. These configurations are seen clearly in FIGS. 2 and 3. The intermediate portion **34** is separated from the upper portion **35** by a reduced area **36** which is defined by a series of engaged embossed portions **37** which may be spot-welded together. The engaged sections **37** define a series of spaced slots **38** through which the products of combustion must pass in going from the intermediate section **34** to the upper section **35** of the combustion chamber **13**. The upper section **35** is of rectangular cross section and has a top wall **39**, opposed side walls **40** and **41** and a bottom wall **42** which tapers from the center upwardly toward the ends, and is provided with a center opening **43** communicating with the outlet duct **16**.

A baffle **44** is positioned on the bottom wall **42** adjacent to the center and extends upwardly and outwardly from both sides of the center toward the ends of the combustion chamber **13**. The baffle **44** comprises a support section **45** which rests on the bottom wall **42** of the combustion chamber **13** adjacent to the center opening **43**, an upwardly extending right angular member **46**, a baffle member **47** which is spaced above and covers the slots **38** in the center of the chamber **13**, and an upwardly and outwardly extending tail **48** which is inclined toward the front wall **40** of the chamber **13**. The baffle **44** and the irregular shape of the combustion chamber **13** regulate and stimulate the combustion of the gaseous fuel and the outside air so that the entire burner **30** remains lighted along its length. The outlet duct **16** for the products of combustion is connected to the upper chamber **35** at the center opening **43** thereof and the inclined portion **48** of the baffle **44** covers approximately the bottom half of the opening **43** and the discharge duct **16** to assist in controlling the rate of discharge of the products of combustion.

A removable door **49** is secured to the front of the combustion chamber **13** along the lowermost burner portion **33**. The door **49** is removable to provide access to the burner **30**, and is held in position by a series of studs **50** fastened along a flange on the top of the burner chamber opening **51** and a series of self-tapping metal screws **52** positioned through the bottom of door **49** and a bottom flange on the burner chamber opening **51**. Both the top and bottom edges of the door **49** and the burner chamber opening **51** are defined by substantially right angular flanges to assist seal means **53** interposed therebetween in sealing the door opening **51** and preventing leakage of products of combustion from the combustion chamber **13**.

Typical dimensions of the combustion chamber **13** are: height about 10 inches, length over 40 inches, and width about 2 inches.

The burner **30** comprises a substantially circular body **54** over ¾ of its cross sectional area with upright side walls **55** and **56** along one edge. The extensions of the side walls **55** and **56** extend above the top of the burner body **54** with a separate member **57** being positioned therebetween. Inwardly projecting embossed spots **58** space the side walls **55** and **56** from the separator **57** and define a plurality of longitudinally and laterally spaced sets of slots **59** along the length of the burner **30**. Typical dimensions of a burner **30** are: 40-inch length, ¾-inch inside diameter of the base **54**, approximately $^{11}/_{16}$-inch height of extensions **55** and **56** and 0.04-inch-wide slots **59**. The uppermost part of embossed spots **58** is ¼ inch below the top surface of side walls **55** and **56** along the entire length of the burner. This provides continuous ports from one end to the other and including the ends.

The pilot **27** is connected to the burner **30** in a conventional manner, and a temperature control and on-off switch **60** is connected to the thermostat **29** which controls the gas supply to an orifice **61**. A burner extension **62** is spaced at **63** from the orifice **61** so that primary air for combustion is mixed with the gaseous fuel from the orifice **61**. The flow of the products of combustion is indicated by the arrows "C" in FIGS. 4–6.

Using the foregoing described construction, no adjustment of the space **63** between the end of the burner extension **62** and the fuel orifice **61** is necessary in changing from natural gas to propane or butene mixtures. Normally, some provision for varying the fuel-primary air mixture is necessary.

The secondary air for combustion is received through the inlet duct **17** and passes through the air passage **18** down behind the air heating chamber **15**. The flow of intake air is indicated by the arrows "B" in FIGS. 4 and 6. The air passage **18** is defined by the outer casing rear wall **24**, a top wall **64** and an intermediate wall **65** spaced from the rear wall **24** and within the heater **13**. The air passage **18** extends substantially along the entire back wall of the heater **10** and along about one-half the bottom of the heater **10** toward the front. This placement insulates the rear wall of the heater from the combustion chamber and provides increased draft for combustion. The wall **65** is formed outwardly at spaced portions **66** along its length to provide a support for the combustion chamber **13**. End closures **67** define the ends of the air passage **18** and seal the passage **18** from the room air.

The combustion chamber **13** is in communication with the air passage **18** at a plurality of locations along the length of the burner **30**. Specifically, opening **68** communicates primary air for combustion to the opening **63** between the burner extension **62** and the orifice **61**. Openings **69** are positioned at the ends and the center of the combustion chamber **13** and admit secondary air for combustion to the bottom of the burner chamber **33**. The spaced openings **69** are necessary to insure that combustion is supported throughout the length of the burner **30**. If sufficient air is not admitted to all of the burner area, the burner **30** tends to draw the products of combustion back into the burner area **33** and snuff out the flame. Closure plates **70** connect the outwardly formed combustion chamber supports **66** with inwardly formed connecting flanges **71** to completely seal the air passage **18** from the room air heating chamber **15**.

A fiberglass insulating pad **72** is positioned on the inner side of the intermediate air passage wall **65** and spaces the combustion chamber **13** from the air passage **18**. Openings corresponding to the openings **68** and **69** allow the air for combustion to be passed through the insulation **72** to the combustion chamber **13** at the preselected locations. The insulation **72** is backed with a thin reflecting foil **73** which reflects the heat from the combustion chamber **13** back toward the room and the front panel **21** of the heater **10**.

The inlet and outlet ducts include a member **74** adapted to be fastened to the outside wall **12** and to the inlet duct **17**. An end cap **75** is positioned on the end of the inlet duct **17** and separates the inlet duct **17** from the outlet duct **16**. The space between the cap **75** and the member **74** is perforated **76** to permit air for combustion to be passed to the inlet duct **17**. An outwardly dished outer cap member **77** is positioned over the end of the outlet duct **16** and is supported on the inlet duct cap by three spaced extension members **78** which are connected by fastening means **79** to the inlet duct cap **75**. An intermediate cap **80** is open at its center **81** and is positioned between the outer cap **77** and the inlet duct cap **75** and also is supported by the extension members **78**.

FIGS. 8–10 show a modification of the present invention which utilizes room air for combustion and discharges products of combustion through the roof. The structure shown in FIGS. 8–10 conforms substantially to the structures hereinbefore described, except that the discharge duct **16** is provided with a right angular portion **16***a* which passes upwardly through a partition wall **100** to the roof (not shown) where it is vented to the atmosphere. The inlet duct **17** terminates at the partition wall **100** and communicates through the partition wall with a louvered vent **101** which passes room air to the combustion chamber **13** for supporting combustion. A down draft duct **102** and baffle **103** product the burner flame from being snuffed out by down drafts through the pipe **16***a*. This arrangement is conventional in room heating equipment.

This invention is intended to cover all changes and modifications of the example of the invention herein chosen for purposes of the disclosure which do not depart from the spirit and scope of the invention.

What is claimed is:

1. A gas-fired baseboard heater comprising an irregularly shaped combustion chamber, including a front panel and a rear panel joined at their top edges and having means for enclosing the side and bottom edges, said panels defining a lower burner containing portion, an intermediate portion joined to the top of the burner portion, said intermediate section being of substantially triangular cross section and being of decreasing height and cross sectional area from its ends toward its center, an upper section of substantially rectangular cross section and being of gradually decreased cross sectional area from its center toward its ends, and a reduced area joining the intermediate portion to the top portion, said reduced area including a series of spaced engaged sections embossed from the front and rear panels and longitudinally separated by a plurality of slots communicating the intermediate portion with the top portion; a chamber for heating room air surrounding said combustion chamber, air intake means, conduit means communicating the air intake means with the combustion chamber at a plurality of spaced locations along the length of the combustion chamber, a burner positioned in the lower portion of the combustion chamber, and a discharge duct for the products of combustion communicating with the combustion chamber.

2. The structure of claim **1** wherein the ratio of the combustion chamber length to height is approximately 4 to 1 and wherein the combustion chamber is sealed from contact with room air.

3. A gas-fired baseboard heater comprising an irregularly shaped combustion chamber, including a front panel and a rear panel joined at their top edges and having means for enclosing the side and bottom edges, said panels defining a lower burner containing portion, an intermediate portion joined to the top of the burner portion, an upper section, and a reduced area joining the intermediate portion to the top portion, said reduced area including a series of spaced engaged sections formed from the front and rear panels and longitudinally separated by slots communicating the intermediate portion with the top portion, a chamber for heating room air surrounding said combustion chamber, air intake means, conduit means communicating the air intake means with the combustion chamber at a plurality of spaced locations along the length of the combustion chamber, a burner positioned in the lower portion of the combustion chamber, a burner extension connected to one end of said burner and extending out of the combustion chamber, a fuel orifice adjacent to the end of the burner extension, a box around the burner extension and the fuel orifice, separate inlet means for primary air for combustion in the box, and a discharge duct for the products of combustion communicating with the combustion chamber.

4. The structure of claim **3** including a passage at the rear of the heater communicating with a manifold at the bottom of the heater and inlet means at the ends and center of the burner portion of the combustion chamber communicating with the manifold, said primary air inlet means also being in communication with the manifold.

5. The structure of claim **3** wherein the ratio of the combustion chamber length to its height is approximately 4 to 1, and wherein the combustion chamber is sealed from contact with room air.

6. A gas-fired baseboard heater comprising an irregularly shaped combustion chamber sealed from contact with room air and having a length to height ratio of approximately 4 to 1, including a front panel and a rear panel joined at their top edges and having means for enclosing the side and bottom edges, said panels defining a lower burner containing portion, an intermediate portion joined to the top of the burner portion, said intermediate section being of substantially triangular cross section and being of decreasing height and cross sectional area from its ends toward its center, an upper section of substantially rectangular cross section and being of gradually decreased cross sectional area from its center toward its ends and a reduced area joining the intermediate portion to the top portion, said reduced area including a series of spaced engaged sections formed from the front and rear panels and longitudinally separated by slots communicating the intermediate portion with the top portion, a chamber for heating room air surrounding said combustion chamber, air intake means, passage means at the rear of the heater communicating with a manifold at the bottom of the heater, and inlet means at the ends and center of the burner portion of the combustion chamber communicating with the manifold, a burner positioned in the lower portion of the combustion chamber, a burner extension connected to one end of said burner and extending out of the combustion chamber, a fuel orifice adjacent to the end of the burner extension, a box around the burner extension and the fuel orifice, separate inlet means for primary air for combustion in the box and in communication with the manifold, and a discharge duct for the products of combustion communicating with the combustion chamber.

7. The structure of claim **6** including a baffle means positioned at the center of the top portion above the reduced area slots in the center of the combustion chamber and positioned in front of the lower portion of the discharge duct opening to the combustion chamber.

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