United States Patent [19]

Morris

[11] **3,765,398**

[45] **Oct. 16, 1973**

[54] **HEATING APPARATUS FOR OUTDOORS OPERATION**

[75] Inventor: **Richard L. Morris,** Indianapolis, Ind.

[73] Assignee: **Carrier Corporation,** Syracuse, N.Y.

[22] Filed: **Oct. 19, 1972**

[21] Appl. No.: **298,971**

[52] **U.S. Cl.** ..... **126/110 B,** 431/20, 137/517

[51] **Int. Cl.** **F24h 3/06**

[58] **Field of Search** ..... 126/110 B, 110 R, 126/116 R; 98/119; 137/517, 521; 431/20

[56] **References Cited**

UNITED STATES PATENTS

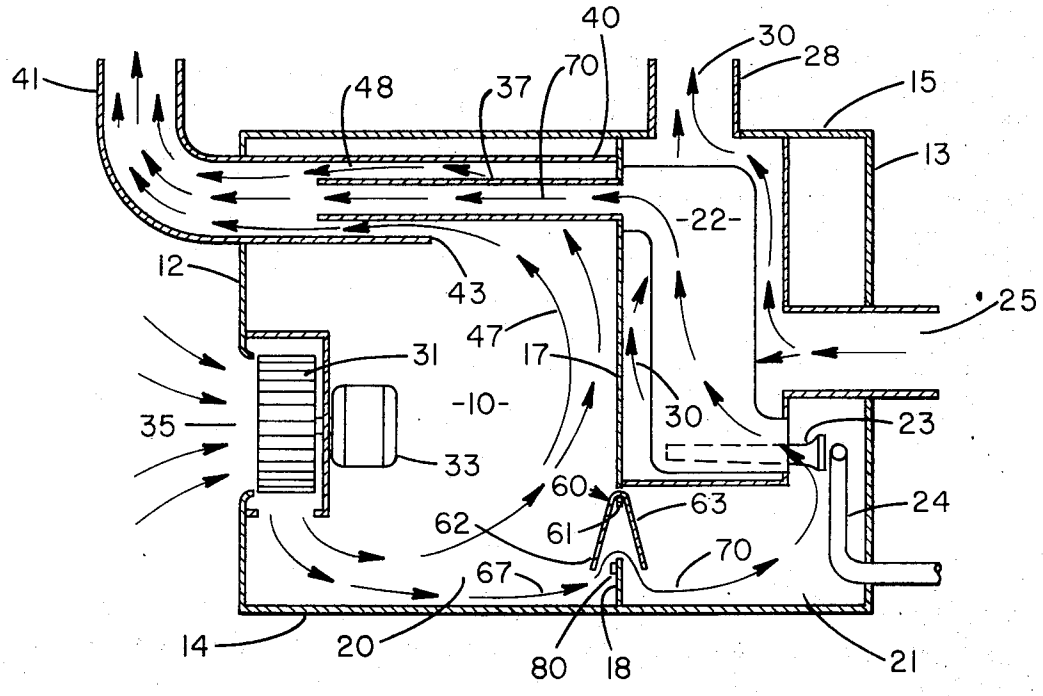
2,499,067	2/1950	Johnson	126/110 B
2,037,857	4/1936	Fox	126/110 B
2,492,777	12/1949	Wirth et al.	126/116 R
2,356,705	8/1944	Siegler et al.	126/110 B
3,473,559	10/1969	Warren, Jr.	98/119
2,823,600	2/1958	Cole	98/119

Primary Examiner—William E. Wayner
Assistant Examiner—William E. Tapolcai, Jr.
Attorney—J. Raymond Curtin

[57] **ABSTRACT**

The casing of a rooftop heating apparatus is formed with plenum and heat exchanger compartments separated by a partition formed with a passage for air flow from the plenum compartment to the burner in the heat exchanger compartment. Damper means is mounted in the air flow passage of the partition and is normally positioned for maximum air flow with the plenum pressurized by a constant speed blower. The intake of the blower is subject to varying wind pressures. The damper means is responsive to air pressure in the plenum to vary the areas of the air flow passage proportionate to the pressure in the plenum and accordingly, to maintain the air flow to the burner at a predetermined level, whereby the burner operation is not adversely affected by gusts of wind.

5 Claims, 3 Drawing Figures



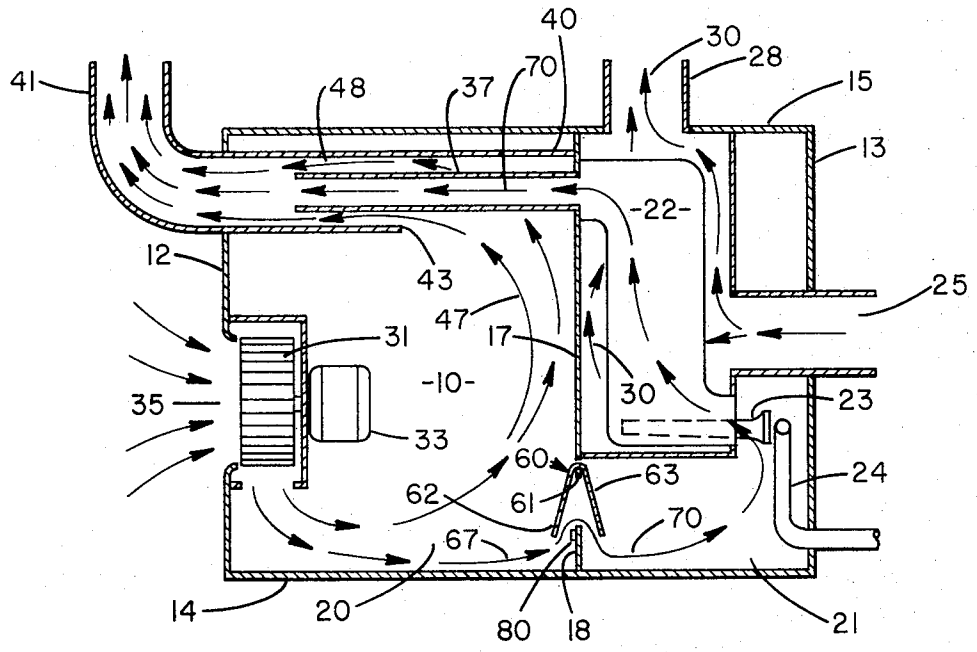


FIG. 1

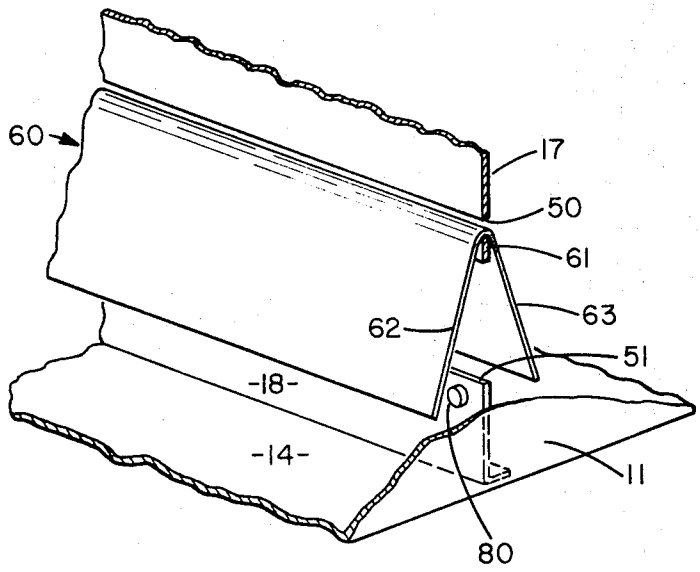


FIG. 2

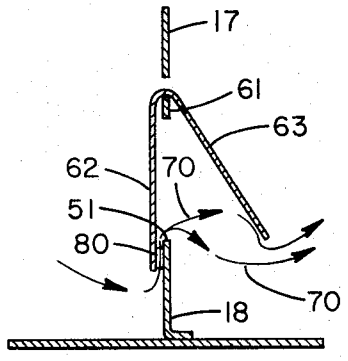


FIG. 3

HEATING APPARATUS FOR OUTDOORS OPERATION

BACKGROUND OF THE INVENTION

Presently, in many instances air conditioning and heating apparatus is mounted on the rooftops of buildings, especially dwellings. In most cases, the heat exchanger of the apparatus is fired with a gas burner. It is well known that gas burners are adjusted as to require a flow of air of predetermined value for proper combustion.

In the arrangement of my invention, the air flow for supporting burner combustion is created by a blower operated at constant speed. However, because the apparatus is located out of doors, the output of the blower varies to a great extent due to gusts of wind entering the intake of the blower. Such sudden increases in the flow of air to the burner can adversely affect the operation of the burner, even to the extent of extinguishing the burner flame.

Many arrangements have been suggested for overcoming the problem above referred to. However, they involve complicated and expensive mechanisms which require periodic maintenance.

This invention has as an object a heating apparatus suitable for rooftop operation wherein the air supplied to the gas burner is maintained at a desired, predetermined level, regardless of ambient conditions.

SUMMARY OF THE INVENTION

The casing of the apparatus is formed with a plenum compartment and a heat exchanger compartment in which there is mounted a gas fired heat exchanger. A partition separates the compartments and is formed with a passage for the flow of air from the plenum to the heat exchanger compartment. Normal air pressure is maintained in the plenum by a constant speed blower and a bypass is provided for bypassing a portion of the air in the plenum compartment to the exterior of the casing.

To maintain the air flow to the burner consistently at a desired level, a damper is mounted in the partition passage and is operative to vary the area of the passage in response to and proportionate to the air pressure in the plenum.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view schematically illustrating a heating apparatus embodying my invention, one side of the casing being removed;

FIG. 2 is an enlarged perspective view of the damper structure; and

FIG. 3 is a view looking to the left in FIG. 2 showing the damper in closed position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The heating apparatus comprises a casing having side walls **10, 11**; end walls **12, 13**; a bottom wall **14** and a top wall **15.** A vertically disposed partition, consisting of an upper section **17** and a lower section **18,** divides the casing into a plenum compartment **20** and a heat exchanger compartment **21.** The heat exchanger **22** is mounted in the heat exchanger compartment **21** and is fired by a gas burner **23** supplied with gas through a conduit **24.**

An air intake **25** communicates with the area about the heat exchanger **22,** the heated air being discharged through a conduit **28** in the top wall **15.** The flow of air is indicated by the arrows **30.**

A blower **31** is mounted in the plenum compartment **20** and is powered by a constant speed motor **33.** The intake **35** of the blower communicates with the atmosphere. The blower functions to discharge air into the plenum compartment. Preferably, the casing is formed with a bypass extending from the plenum compartment **20** to the atmosphere. In the arrangement shown, a stack is provided for conveying products of combustion from the heat exchanger **22** to the atmosphere. As shown in FIG. **1,** the bypass is incorporated in the stack structure. A tube **37,** having communication with the heat exchanger **22,** extends through the partition section **17** toward the end wall **12.** A larger tube **40** has a horizontally disposed portion extending from the partition **17** outwardly through the end wall **12** for communication with the vertically disposed portion **41,** communicating with the atmosphere. The tube **40** is arranged in spaced concentric relation to the tube **37.** A portion of the underside of the tube **40** is cut away. In FIG. **1,** the bottom side of the tube **40** terminates at **43.** This presents an opening to the space between the tubes **37** and **40** through which air flows from the plenum **20** as indicated by the arrows **47,** the flow continuing about the exterior of the tube **37** as indicated by arrows **48** to the vertical portion **41** of the stack.

The lower edge **50** of the upper partition section **17** is positioned in upwardly spaced relation to the lower section **18.** The partition sections **17, 18** extend transversely of the casing between the side walls **10, 11.** The space between the partition sections **17, 18** provides a passage for the flow of air from the plenum chamber to the heat exchanger compartment.

A damper means is mounted in the air flow passage and functions to automatically maintain the flow of air through the passage at a predetermined level, regardless of gusts of wind passing through the blower inlet **35.**

The damper **60** is formed of sheet material and is of inverted "V" configuration. The damper **60** is pivotally supported on a member **61** extending transversely between the walls **10, 11** of the casing. The sides **62, 63** of the damper diverge downwardly from the support pivot **61** and terminate a distance below the lower edge **51** of the air flow passage. The upper and lower portions **17, 18** of the partition, above and below the air flow passage, are arranged in vertical alignment. The sides **62, 63** of the damper are of equal size whereby the sides of the damper are normally positioned in spaced straddling relation to the lower portion **18** of the partition as shown in FIGS. **1** and **2.** The air flow from the plenum, indicated by the arrows **67,** FIG. **1,** strikes against the upstream side **62** of the damper and passes upwardly under the lower edge of the side **62** and over the edge **51** at the bottom of the air flow passage, as indicated by the arrows **70.** The air flow over the edge **51** strikes against the inner surface of the side **63** of the damper. With the damper positioned as shown in FIGS. **1** and **2,** the air flow to the burner is at a level providing correct combustion for heating the heat exchanger **22.**

A gust of wind passing through the inlet **35** of the blower will increase the output of the blower, and the pressure in the plenum compartment **20.** This increase

in pressure acting against the outer side of the damper leg **62**, and on the inner surface of the damper leg **63**, will cause the damper to swing in a counter-clockwise direction, referring to the drawings, moving the side **62** of the damper toward the passage edge **51**, and accordingly reducing the flow of air between the side **62** of the damper and the lower portion of the partition. This movement of the damper will be proportionate to the rise of pressure in the plenum compartment because of the bypass through the space between the stack tube **40** and the inner tube **37**.

The air flow through the bypass and the weight of the damper **60** are coordinated relative to the output of the blower **31** such that in the absence of any wind pressure at the inlet of the blower **31**, the damper hangs in the straddling position shown in FIGS. **1** and **2**, and air flow to the burner is at the proper level. However, with wind pressure at the inlet **35** of the blower, causing an increase in the pressure in the plenum chamber **20**, the damper **60** will be moved in counterclockwise direction to reduce the spacing between the lower portion of the side **62** of the damper and the lower partition section **18**. In other words, the air passage will be reduced in area proportionate to the pressure in the plenum **20**. Accordingly, the air flow to the burner **23** will be maintained at the proper level.

Stop means is provided to prevent the side **62** of the damper from moving into direct contact with the lower portion **18** of the partition to completely close the air flow passage. This stop means may be conveniently provided by one or more stops **80** fixed to the upstream side of the partition section **18**.

While I have described the preferred embodiments of my invention, it is to be understood that the invention is not limited thereto, but may be otherwise embodied within the scope of the following claims.

I claim:

1. Heating apparatus for outdoors operation comprising a casing formed with a heat exchanger compartment and a plenum compartment, said compartments being separated by a partition, a heat exchanger mounted in said heat exchanger compartment, a burner associated with said heat exchanger for heating the same, a constant speed air blower having an intake communicating with the outdoor atmosphere and subject to varying wind pressure, said blower being operable to discharge air into said plenum compartment, a stack connected to said heat exchanger for the conveyance of products of combustion from said heat exchanger to the exterior of said casing, a bypass means extending from said plenum compartment to the exterior of said casing for the flow of air therefrom, an air flow passage extending through said partition from said plenum compartment to the burner in said heat exchanger compartment, an air flow control damper means mounted in said air flow passage, said damper means being movable from normal maximum air flow position to minimum air flow position, such movement being proportionate to the variation in wind pressure at the intake of said blower, said damper being operable during such movement to maintain the volume of air flow through said air flow passage at a predetermined level.

2. Heating apparatus as set forth in claim **1** wherein said burner is a gas fired burner.

3. Heating apparatus as set forth in claim **1** wherein said bypass means communicates with said stack.

4. Heating apparatus as set forth in claim **1** wherein said partition is disposed vertically in said casing and said air flow passage is disposed upwardly from the bottom of said plenum compartment and extends transversely thereof, said damper means consisting of an inverted "V" shaped member, support means pivotally supporting said member in said air flow passage at the bight of said member for free pivotal movement, with the sides of said member diverging downwardly from said pivot and being normally positioned in spaced straddling relation to the bottom side of said air flow passage whereby the upstream side of said damper member is moved toward said partition for reducing the area of said air flow passage proportionate to an increase in the air pressure from normal in said plenum.

5. Heating apparatus as set forth in claim **4** and including stop means for limiting movement of said upstream side of said damper toward said partition.

* * * * *