

[54] **HEATING SYSTEM WITH EXTERIOR AIR INLET FOR COMBUSTION CHAMBER**[76] Inventor: **Robert S. Dyer**, 21 W. 16th St., Apt. 1-B, Indianapolis, Ind. 46202

[*] Notice: The portion of the term of this patent subsequent to Apr. 23, 1991, has been disclaimed.

[22] Filed: **Mar. 7, 1974**[21] Appl. No.: **449,022****Related U.S. Application Data**

[63] Continuation-in-part of Ser. No. 303,711, Nov. 1, 1972, Pat. No. 3,805,764.

[52] U.S. Cl. **126/110 R; 126/85 B; 236/10**[51] Int. Cl.² **F24F 3/06**[58] Field of Search **126/85 B, 110 R, 112; 236/10; 237/53**[56] **References Cited****UNITED STATES PATENTS**

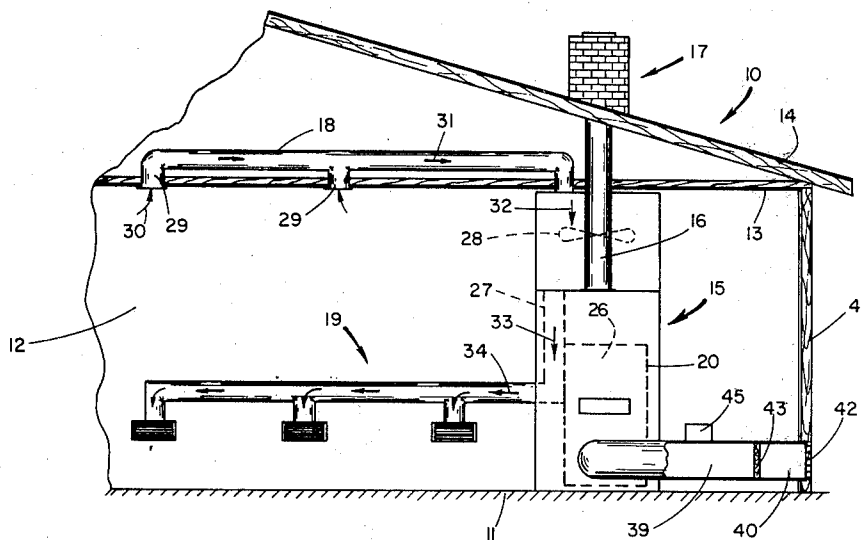
1,935,237	11/1933	Bryant	236/10 X
2,242,802	5/1941	Stramaglia	126/112 X
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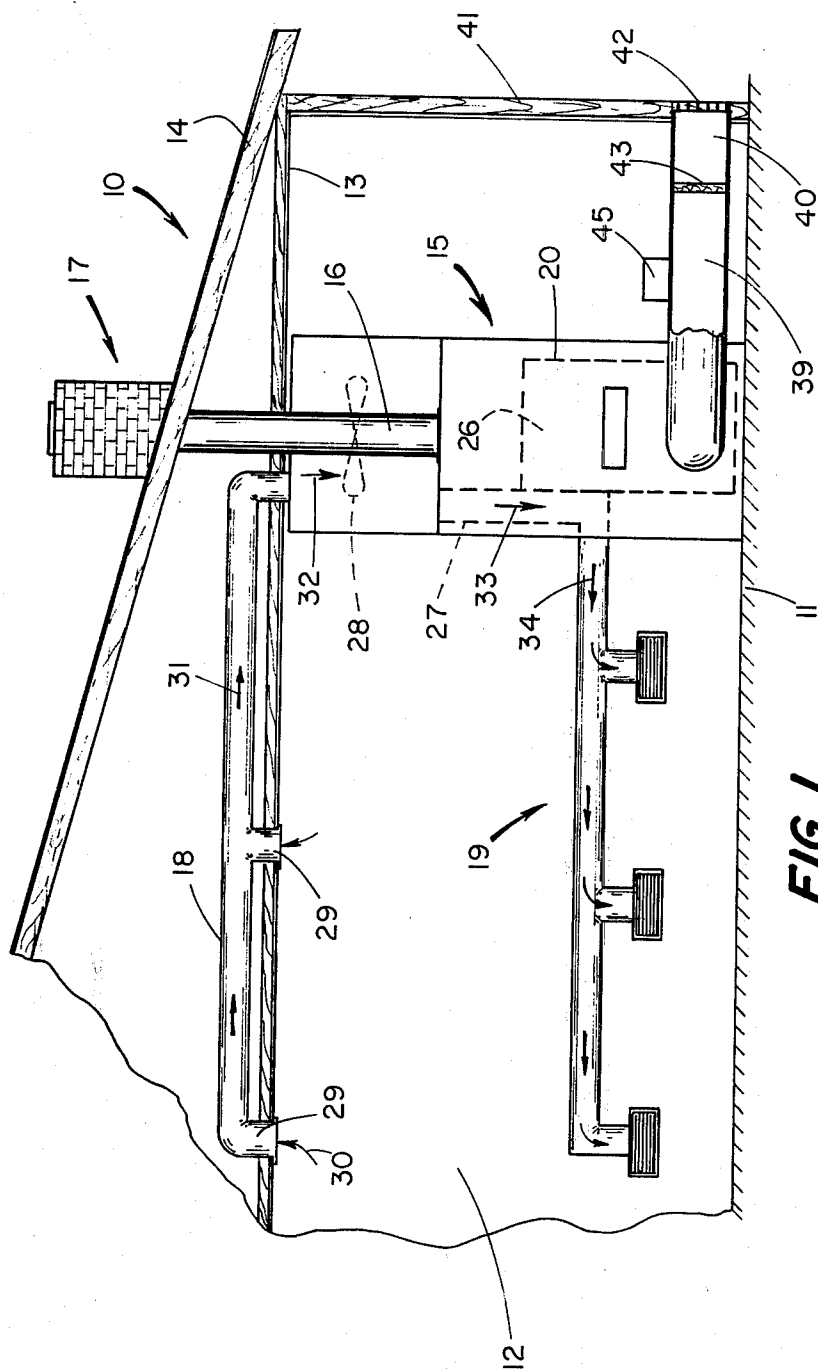
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Primary Examiner—William E. Wayner
Attorney, Agent, or Firm—Woodard, Weikart,
 Emhardt & Naughton

[57] **ABSTRACT**

A forced air heating system having a combustion chamber with an air inlet which leads exteriorly of the building heated. A furnace includes a combustion chamber with an outlet connected to a flue leading from the chamber to exteriorly of the building. The combustion chamber has an air inlet connected to an air inlet duct which leads exteriorly of the building to allow air flow into the chamber for combustion purposes. The furnace includes a heating passage adjacent to the combustion chamber which is connected to cold air ducts and hot air ducts. Means mounted in the heat passage is operable to force air from the cold air ducts through the heating passage to the hot air ducts. A valve means is provided in the air inlet duct leading to the combustion chamber for control of air through the air inlet duct.

3 Claims, 5 Drawing Figures



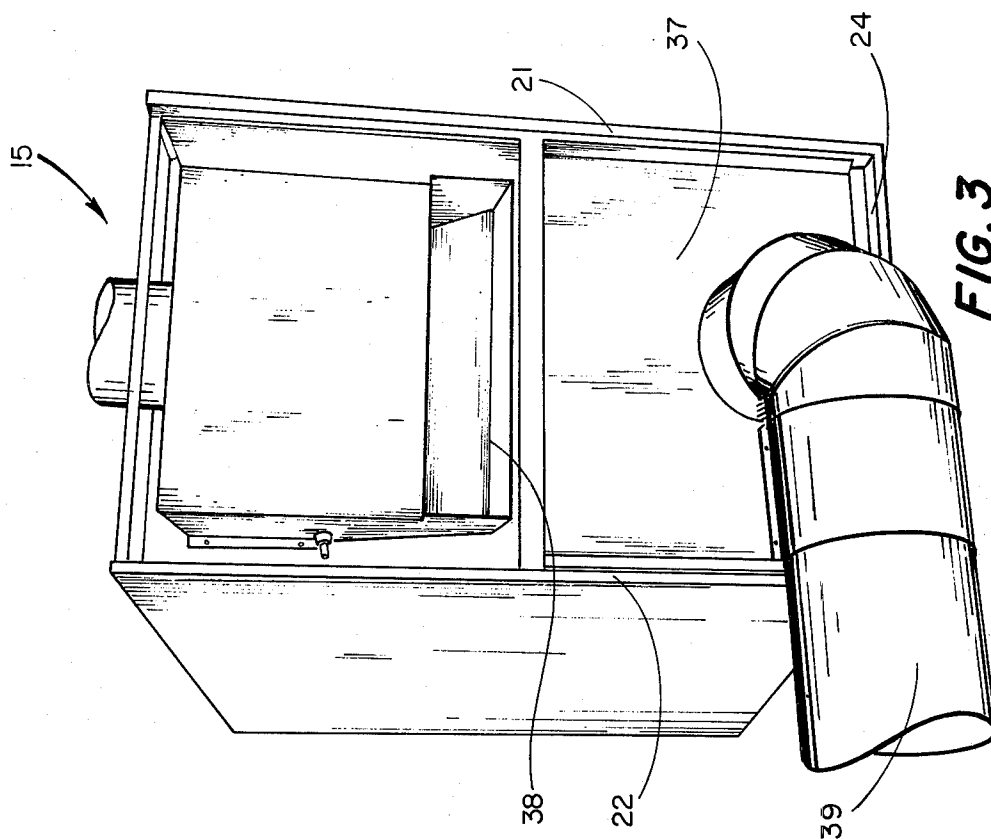


FIG. 3

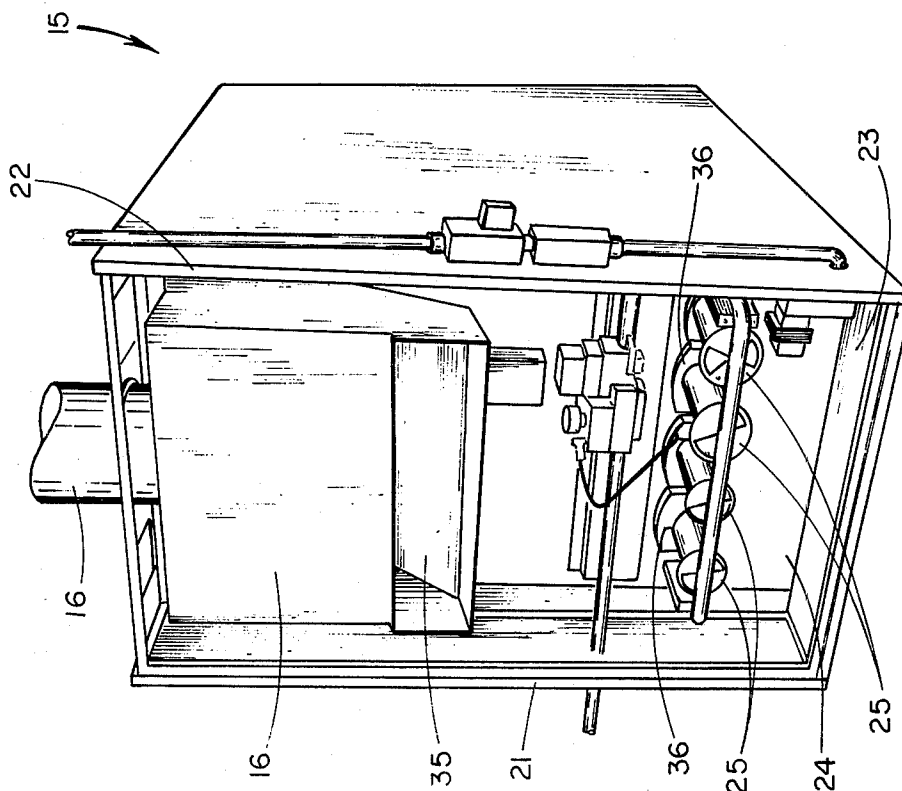


FIG. 2

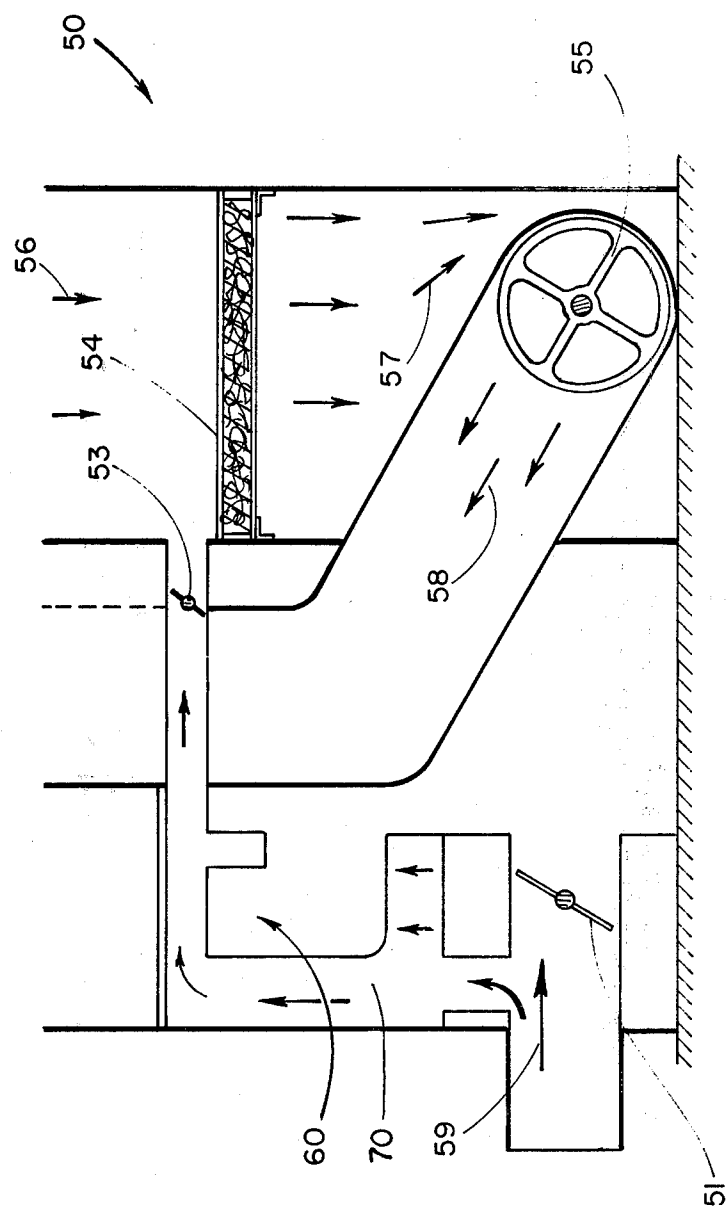
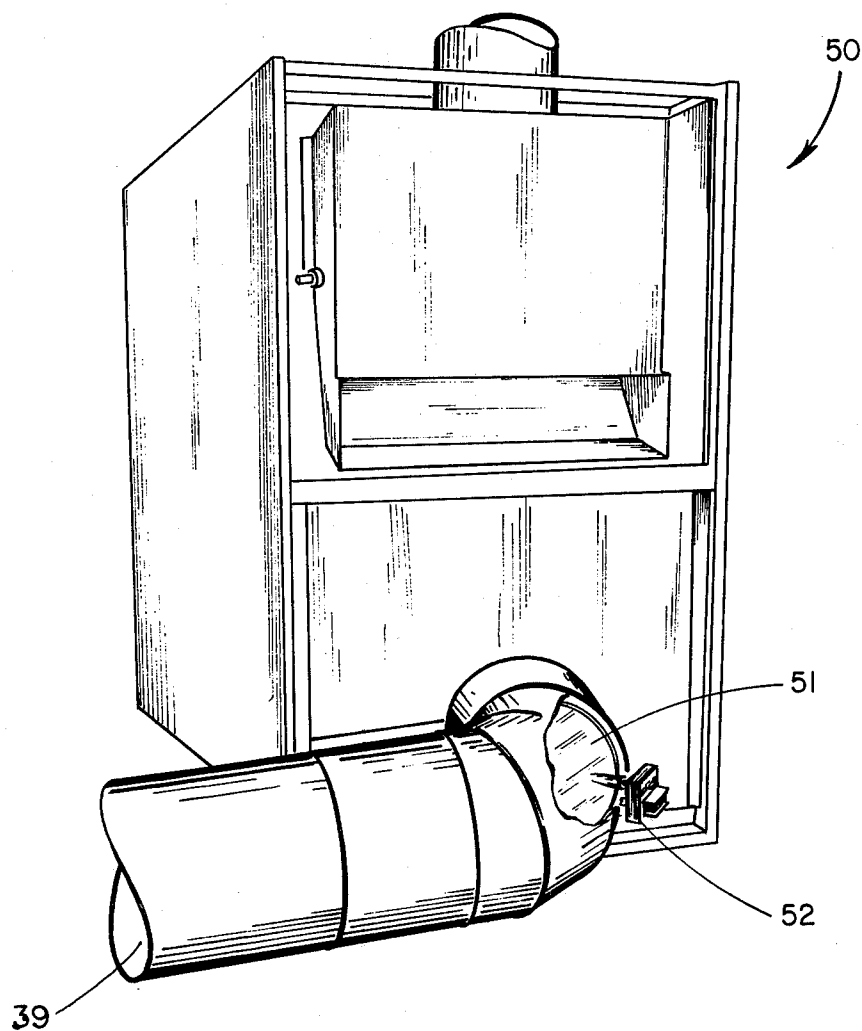


FIG. 4

**FIG. 5**

HEATING SYSTEM WITH EXTERIOR AIR INLET FOR COMBUSTION CHAMBER

CROSS-REFERENCE TO RELATED APPLICATION

This is a continuation-in-part of copending, allowed application Ser. No. 303,711, filed Nov. 1, 1972 and allowed Nov. 14, 1973 now U.S. Pat. No. 3,805,764.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention is in the field of heating systems for buildings.

2. Description of the Prior Art

A representative sample of the prior art is disclosed in the following U.S. Pat. Nos. 1,447,631 issued to C. Rue; 1,472,706 issued to F. Weineck; 1,586,407 issued to F. H. Carson; and 2,242,802 issued to N. Stramaglia.

Oil and gas fired forced air furnaces consume thousands of cubic feet of air in their combustion chambers during the heating season. The present furnaces as disclosed by the prior art patents are designed to admit air into the combustion chamber with the air flowing from any direction within the building into the combustion chamber. That is, the air which is required for combustion is provided from the air within the building. As a result, air must flow from outside of the building to inside of the building to fill the void left by the air flowing into the combustion chamber and out through the flue. Air from the external atmosphere outside of the building is filled with particulate matter and is therefore polluted. This polluted air therefore flows through the building and is undesirable. The system disclosed herein has an air inlet duct which leads from exterior of the building directly to the combustion chamber. Thus, the outside polluted air is not required to flow through the building with the exception of through the air inlet duct.

SUMMARY OF THE INVENTION

One embodiment of the present invention is in combination with a furnace for heating a building including a combustion chamber having an outlet and a flue connected to the output leading from the chamber to exteriorly of the building for escape of exhaust gases, first means leading from the combustion chamber to allow air to pass therethrough to the chamber, the furnace further includes a heating passage adjacent the combustion chamber, cold air ducts connected to the furnace which lead from interiorly in the building to the heating passage, and hot air ducts connected to the furnace which lead from the combustion chamber terminating within the building, means mounted in the passage operable to force air from the cold air ducts through the heating passage and out the hot air ducts wherein the improvement comprises an air inlet duct connected to the furnace at the first means and extending exteriorly of the building allowing air outside the building to pass therethrough to the combustion chamber for combustion purposes, the air inlet duct and the first means and the combustion chamber being constructed to allow air flow into the chamber only through the air inlet duct.

It is an object of the present invention to provide a new and improved heating system.

It is a further object of the present invention to provide a heating system which obtains all of the air re-

quired for combustion from externally of the building being heated.

It is a still further object of the present invention to provide damper means for controlling the flow of fresh air into a furnace.

In addition, it is an object of the present invention to provide an air inlet duct which leads from a position external of the building being heated to a furnace combustion chamber.

Related objects and advantages of the present invention will be apparent from the following description.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic representation of a building having the heating system incorporating the present invention.

FIG. 2 is a front view of a furnace incorporating the present invention with an outer wall removed therefrom.

FIG. 3 is the same view as FIG. 2 only showing the air inlet duct mounted thereto which leads from outside of the building shown in FIG. 1 to the combustion chamber.

FIG. 4 is a schematic representation of a furnace having the bypass duct and dampers of the present invention.

FIG. 5 is a front view of a furnace incorporating the present invention with dampers and bypass duct.

DESCRIPTION OF THE PREFERRED EMBODIMENT

For the purposes of promoting an understanding of the principles of the invention, reference will now be made to the embodiment illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, such alterations and further modifications in the illustrated device, and such further applications of the principles of the invention as illustrated therein being contemplated as would normally occur to one skilled in the art to which the invention relates.

Referring now more particularly to FIG. 1, there is shown a building 10 having a floor 11, a side wall 12, a ceiling 13 and a roof 14. Furnace 15 is mounted atop floor 11 and includes a flue 16 which is connected to chimney 17 positioned on roof 14.

The furnace shown in FIG. 1 is a forced air down draft furnace with the cold air ducts 18 mounted atop ceiling 13 and the hot air ducts 19 positioned above floor 11. Although the furnace shown in FIG. 1 is a down draft furnace, it is to be understood that the present invention also applies to other furnaces which are not down draft furnaces including up draft furnaces.

The front wall 20 of furnace 15 has been removed in FIG. 2 to more clearly illustrate some of the inner parts of the furnace. The furnace includes a pair of side walls 21 and 22 connected to the bottom wall 23. Wall 24 is connected to the side walls and extends upwardly behind a plurality of air flow tubes 25 behind which is located a gas fired or oil fired combustion chamber. The combustion chamber 26 (FIG. 1) is surrounded by a heating passage 27 which is connected at one end to cold air duct 18 and at the opposite end to hot air duct 19. An electric driven impellor 28 is mounted within the furnace and is operable to force air into the outlets 29 of cold air duct 18 in the direction of arrow 30. The

air then flows in the direction of arrows 31, 32, 33 and 34 through the hot air duct 19.

Furnace 15 is a conventional gas or oil fired furnace with combustion chamber 26 having an outlet which is connected to flue 16 allowing for the escape of exhaust gases. Flue 16 is provided with an air opening 35 (FIG. 2) which may also be connected to the outside atmosphere. Mounted to wall 24 which is connected to side walls 21, 22 and bottom wall 23 are a plurality of tubes 25. Tubes 25 have inner ends 36 which open into the combustion chamber. The outer ends of tubes 25 open between walls 21, 22, 23 and 24. Normally, air which surrounds the outer side walls of the furnace enters apertures provided in the outer ends of tubes 25 and then flows inwardly towards the combustion chamber for purposes of combustion. A system incorporating the present invention has a pair of walls 37 and 38 which are mounted to walls 21 through 24 so as to define an air tight enclosure. A hollow tube 39 has an inner end mounted to wall 37 (FIG. 3) and an outer end 40 (FIG. 1) extending through and mounted to wall 41 of building 10. Thus, air is allowed to enter the combustion chamber only through air inlet tube 39.

A grate 42 is mounted to end 40 of air inlet tube 39 thereby preventing large objects from entering the tube. In addition, a filter 43 is mounted within tube 39 to filter the incoming exterior air which passes through tube 39 to the combustion chamber.

The heating system incorporating the present invention will provide a much cleaner atmosphere within the building being heated since exterior polluted air is not drawn into the building for purposes of combustion. In addition, cold air drafts will be reduced or eliminated around windows, doors, fireplaces, vents and various small openings. The present invention solves the problem of drawing external polluted air into the building being heated by sealing the combustion chamber so that interior air within the building is prevented from entering the furnace. A large duct or pipe is then provided to bring exterior air directly to the combustion chamber.

It will be obvious from the above description that the present invention provides a new and improved heating system. It will be further obvious from the above description that the present invention provides a heating system which has means for delivering external air directly to the combustion chamber. An example of a variation of the heating system disclosed herein which would be included in the present invention would be a furnace which burns coal in lieu of gas or oil. In fact, any combustible material may be used in a furnace incorporating the present invention. A significant advantage of the furnace of the present invention is that existing furnaces may be conveniently modified to incorporate the embodiments described herein.

An especially preferred embodiment of this invention incorporates additional structural elements to increase the efficiency of utilization of gas beyond that which can normally be accomplished and also to increase the comfort of the building being heated. The first structural element is a damper 51 which is best shown in FIG. 4. Damper 51 may be in the form of any of the well-known standard dampers. The valve type damper as shown in FIG. 4 is but one convenient damper embodiment. This valve damper may be replaced by a parallel blade damper or an opposed blade damper, all of which are equally effective in regulating the flow of air

59 through tube 39 into combustion chamber 26. The preferred type of damper would be the opposed blade damper because of the non-turbulent air flow resulting therefrom. Damper 51 may be located inside the furnace unit 15 as shown in FIG. 4 or it may be located external to the furnace unit in tube 39 as shown in FIG. 5. Damper 51 is controlled by the thermostat which would normally be inside the building to be heated. When the thermostat is in the on or open position it activates a motor 52 which in turn pivots damper 51 to the open position. The opening of damper 51 closes a switch which allows the furnace to turn on while at the same time fresh air 59 is provided. The advantages of fresh air combustion have been explained supra. In addition, the thermostat and damper 51 are synchronized so that the fresh air entering combustion chamber 26 will not cool tubes 25 below the temperature at which they can effectively operate. As before the heated air from combustion chamber 26 escapes through the flue 16.

A second structural modification involves the placement of a bypass duct 70 as shown in FIG. 4. Bypass duct 70 allows warm fresh air to be placed in cold air duct 18 (air flow indicated as 56 and 57) so that during operation of the furnace 50, warm fresh air 59 can be continuously supplied to the building. However, there are some weather conditions, i.e., when it is extremely cold outside, when you would not want to have fresh air 59 entering the furnace 50 and building. For this purpose an additional damper 53 is supplied to control entry of fresh air into cold air duct 18 and then through filter 54. Damper 53 may be controlled manually or automatically and may be regulated to allow as much or as little fresh air as is desired.

These improved structural elements offer many advantages over prior heating methods. The fact that fresh air can be optionally circulated through the building is a great aid to comfort and cleanliness. In addition, the use of heated fresh air through bypass duct 70 increases the efficiency of the overall heating operation. Specifically, heated air 60 which was previously completely lost through the flue 16 is now used to heat a portion of the fresh air 59 going into the building. A blower 55 is indicated in FIG. 4 to show the preferred method for forcing the heated air into the building.

While the invention has been illustrated and described in detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character, it being understood that only the preferred embodiment has been shown and described and that all changes and modifications that come within the spirit of the invention are desired to be protected.

The invention claimed is:

1. In combination with a building and a furnace for heating said building including a combustion chamber having an outlet and a flue connected to said outlet leading from said chamber to exteriorly of said building for escape of exhaust gases, first means leading from said combustion chamber to allow air to pass there-through to said chamber, said furnace further includes a heating passage adjacent said combustion chamber, cold air ducts connected to said furnace which lead from interiorly in said building to said heating passage, and hot air ducts connected to said furnace which lead from said combustion chamber terminating within said building, means mounted in said passage operable to

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force air from said cold air ducts through said heating passage and out said hot air ducts, an air inlet duct connected to said furnace at said first means and extending exteriorly of said building allowing air outside said building to pass therethrough to said combustion chamber for combustion purposes, said air inlet duct and said first means and said combustion chamber being constructed to allow air flow into said chamber only through said air inlet duct;

said furnace includes a first wall, a pair of said walls and a bottom wall connected together with said first means including a plurality of tubes mounted to said first wall and extending outwardly directly from said combustion chamber, wherein the improvement comprises:

said furnace further including enclosure walls mounted to said side walls, said bottom wall and said first wall defining an enclosure into which said tubes open, said air inlet duct is connected to one of said enclosure walls allowing air from externally of said building to pass therethrough into said enclosure, said enclosure is sealed to allow air to enter said combustion chamber only from said air inlet duct;

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said air inlet duct is mounted at one end to one of said enclosure walls at an opposite end to an exterior side wall of said building, said side wall of said building including a grate mounted to said opposite end of said air inlet duct;

a filter mounted to said air inlet duct which filters incoming exterior air passing through said air inlet duct and wherein:

said furnace is a forced air down draft furnace; first valve means mounted in said air inlet duct operable to control the amount of incoming exterior air passing into said combustion chamber.

2. The furnace of claim 1 and further comprising:

a bypass duct, said bypass duct connecting said air inlet duct to said cold air ducts, said bypass duct allowing the passage of fresh air from said air inlet duct to said cold air ducts.

3. The furnace of claim 2 and further comprising:

second valve means mounted in said bypass duct which control the amount of incoming exterior air passing into said cold air ducts, said second valve means being manually controlled.

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