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(54) **INSULATING METHOD AND DUCTING CONFIGURATION**

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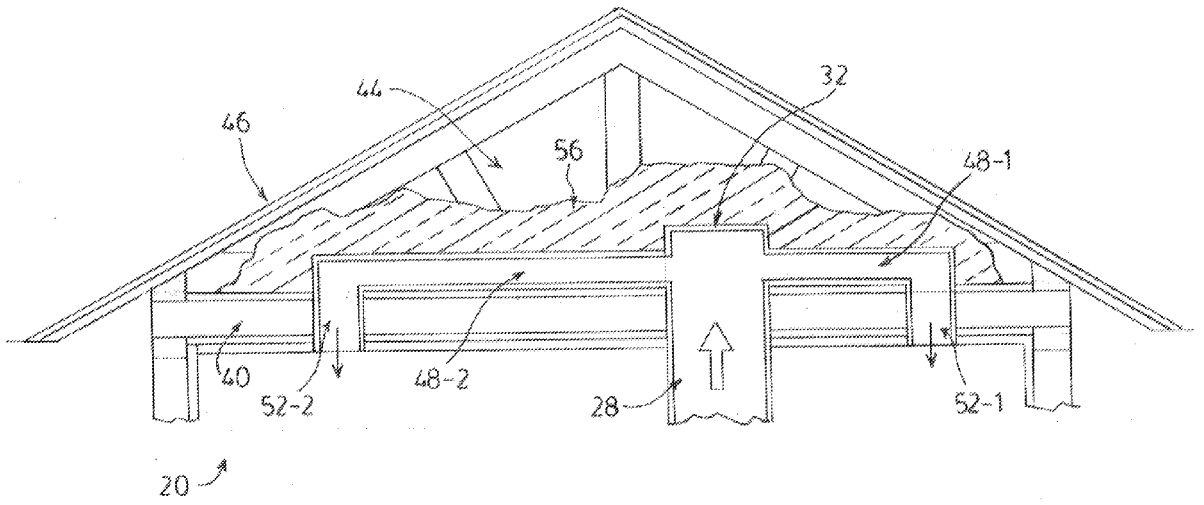
(57) **ABSTRACT**

An insulation method and ducting configuration is provided. In an embodiment, an attic space of a house has at least one air duct running along a horizontal portion of said attic space. At least a portion of the at least one air duct is covered by a layer of foam insulation.



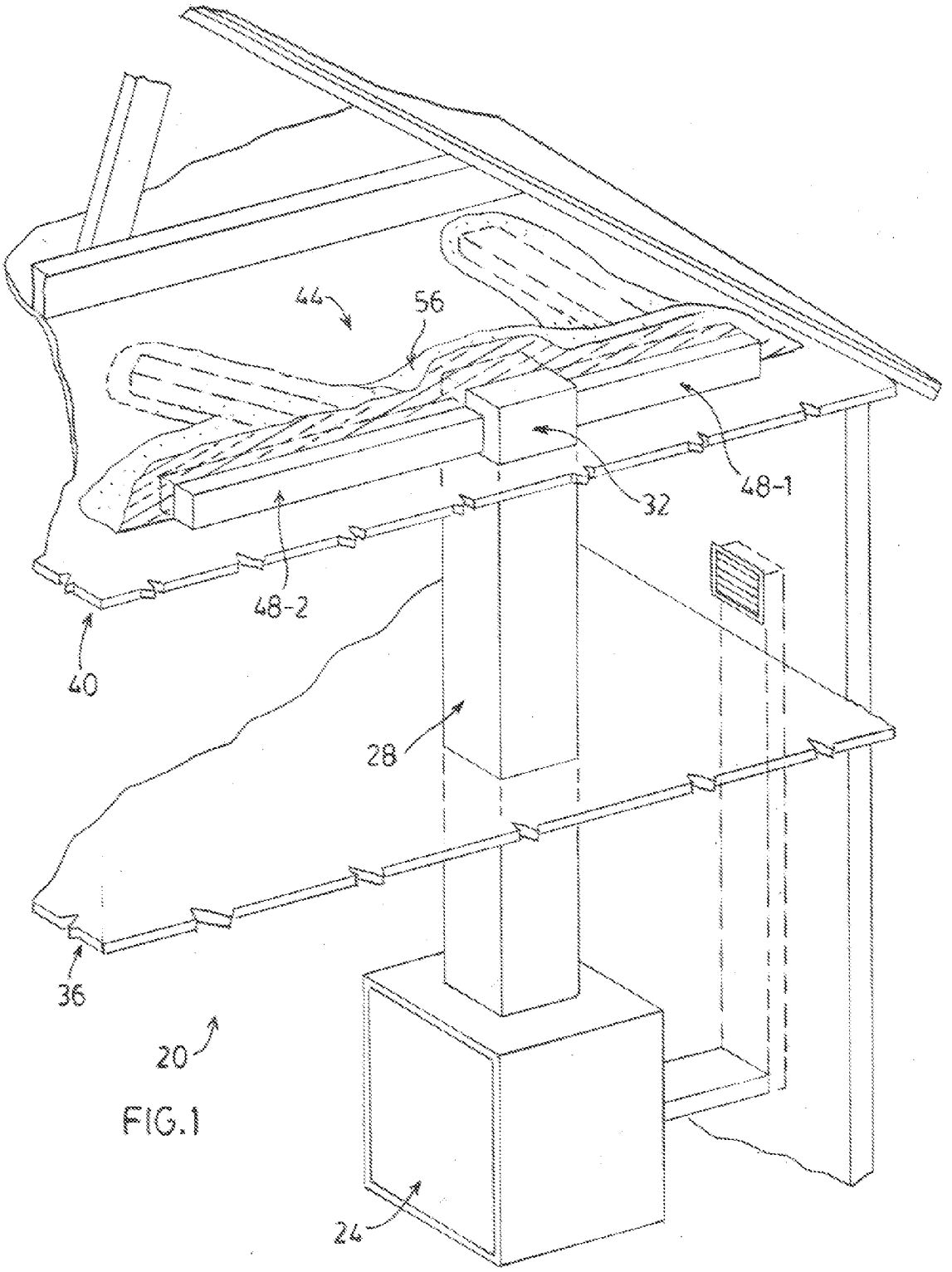


FIG.1

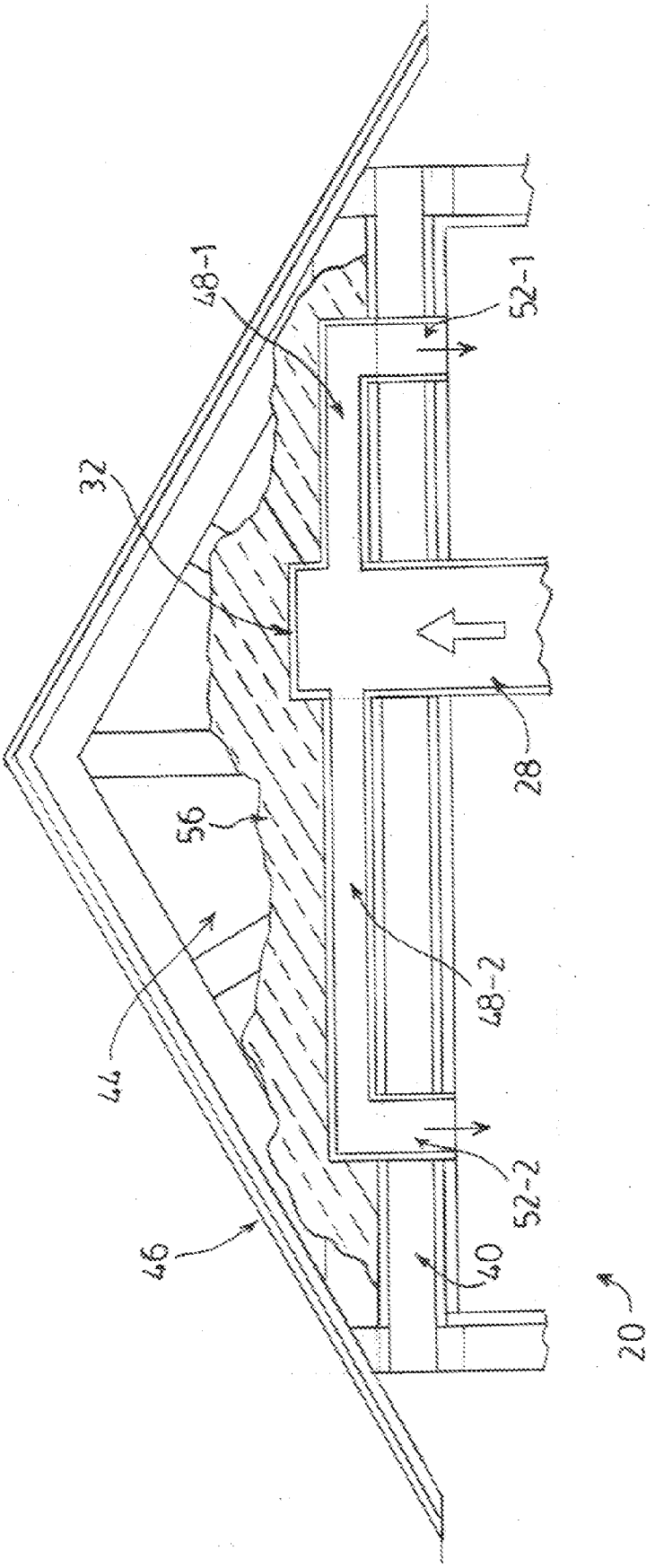


FIG. 2

INSULATING METHOD AND DUCTING CONFIGURATION

CROSS-REFERENCE TO RELATED APPLICATION

[0001] Applicants claim priority of Canadian Application, Ser. No. 2,570,613, filed Dec. 7, 2006.

FIELD OF THE INVENTION

[0002] The present invention relates to building construction and more particularly relates to a method for insulation and a related configuration of ductwork.

BACKGROUND OF THE INVENTION

[0003] Housing constructing is an ever advancing art. New materials, techniques and designs are constantly being introduced in a quest to improve housing quality and comfort while reducing costs. Increasingly, demands are also being made to improve the energy efficiency of houses. Housing in colder climates requires heating systems, but with increasing energy costs on ongoing climate change issues, there is demand to improve the efficiency of those heating systems and to maximize benefits from insulation of the house's exterior. Likewise, warmer climates can require air conditioning systems, and energy efficiency from air conditioning likewise requires efficient cooling systems and effective insulation.

[0004] It is known to provide air-return ducts on multiple floors of the house to increase the overall circulation of air and the house and ultimately improve on the efficiency of the furnace. However, it is common to run the air ducts along the exterior walls of the home which thereby results in the unwanted transfer of kinetic energy between air in the ducts and home exterior. It is also for this reason that it is atypical to run ventilation ducts through the attic of the home.

[0005] Leakiness of air ducts is a factor that discourages the passage of air ducts through an attic. Junctions between different sections of air ducts are often not completely sealed, and can result in the passage of air between the duct and the surrounding environment. In a heating duct running through an attic, such leakage could introduce unwanted moisture into the attic environment, resulting in rot and/or mould growth.

SUMMARY OF THE INVENTION

[0006] An object of the invention is provide a novel insulation and/or ducting configuration that obviates or mitigates at least one of the disadvantages of the prior art.

[0007] An aspect of the invention provides a house comprising a base structure comprising a heat exchanger and an air duct connected to the heat exchanger. The house also comprises an attic structure above the base structure comprising at least one additional air duct connected to the heat exchanger via the air duct. The house also comprises a layer of foam insulation substantially continuously covering at least a portion of the at least one additional air duct.

[0008] The foam insulation can be sprayed polyurethane foam.

[0009] The foam insulation can cover an entire area of the attic structure.

[0010] The air duct and the at least one additional air duct can be supply ducts or return ducts.

[0011] The heat exchanger can be a furnace and/or an air conditioning unit.

[0012] Another aspect of the invention provides an attic structure comprising a horizontal portion defining a ceiling of a space below the attic structure. The attic structure further comprises at least one air duct running along the horizontal portion. The layer of foam insulation substantially continuously covers at least a portion of the at least one air duct.

[0013] The foam insulation can be sprayed polyurethane foam. The foam insulation can cover an entire area of the attic structure. The air duct can be supply ducts or return ducts.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. **1** is a cut-away perspective view of a portion of home with an insulated attic and duct configuration in accordance with an embodiment of the invention.

[0015] FIG. **2** is a sectional view of the home of FIG. **1**.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0016] Referring now to FIGS. **1** and **2**, a portion of a home is indicated generally at **20**. As seen in FIG. **1**, home **20** comprises a heat exchanger unit which in a present embodiment is a furnace **24**. It should be understood that in other embodiments, the heat exchanger unity can be an air-conditioner and/or a combination of a furnace and air-conditioner.

[0017] Furnace **24** is connected to a supply duct **28** which delivers warm air from furnace **24** to a plenum **32**. Supply duct **28** is passed through an interior section of house **20**, and away from the exterior walls of house **20**, thereby reducing the likelihood of heat transfer from the interior of supply duct **28** and the exterior of house **20**. To the extent any heat transfer occurs, it will go to the benefit of the occupants of rooms through which supply duct **28** passes. Furnace **24** is located on a first floor, typically a basement, while supply duct **28** passes through at least one floor **36** and finally through an upper floor ceiling **40**. Thus, plenum **32** is located in an attic **44** of home **20**.

[0018] The use of the term "attic" is not intended to be limiting and can refer to any space defined in the top by a roof **46** and in the bottom by a horizontal structure (such as ceiling **40**) that defines a ceiling for a space below the attic.

[0019] Plenum **32** is connected to a plurality of branch supply ducts **48-1** and **48-2**. Ducts **48-1** and **48-2** run through the along the surface of ceiling **40**. Ducts **48-1** and **48-2** each terminates at a respective vent **52-1** and **52-2**. As can be seen in FIG. **2**, supply air rises through supply duct **28** and is carried along ducts **48-1** and **48-2** until it is expelled from vents **52-1** and **52-2**.

[0020] Home **20** also comprises a layer of foam **56** disposed within attic **44**. In a present embodiment, foam **56** is polyurethane foam that is sprayed over the entirety of plenum **32** and supply ducts **48-1** and **48-2**. Various types of insulating foam are contemplated, including open cell foam, or closed cell foam, low density foam, or high density foam. The thickness of foam **56** is not particularly prescribed, but in general a sufficient layer of foam **56** is applied so as to substantially eliminate or reduce the transfer of heat between plenum **32** and ducts **48-1** and **48-2** and the space of attic **44**. In this manner, the temperature of air in plenum **32** is substantially the same as the temperature of air that exits vents **52-1** and **52-2**. While not required, it is presently preferred to also substantially seal any leaks in the ducts, to thereby prevent and/or substantially mitigate the transfer of air between ducts **48-1** and **48-2** and the space of attic **44**. The thickness of foam

56 is chosen to provide a desired "R" value of insulation, the "R" value being a unit of measure that quantifies the effectiveness of a building material to resist the flow of heat. Since foam **56** is sprayed into the relatively large volume of attic **44**, larger volumes/thicknesses of low density foam can be used to achieve the same R value as a high density foam, while potentially reducing costs as low density foam is often cheaper than high density foam. Exemplary desirable R Values include R32 or R40. However, the R value that is chosen can also be prescribed by various, provincial, state, federal or municipal building codes.

[0021] During construction of home **20**, plenum **32**, ducts **48** and vents **52** are first installed within attic **44**. Next, foam **56** is applied via spraying at least over plenum **32** and supply ducts **48**, and typically over the entire attic space to thereby completely insulate attic **44**.

[0022] While certain specific combinations of the various features and components of the present invention have been discussed herein, it will be apparent to those of skill in the art that desired subsets of the disclosed features and components and/or alternative combinations of these features and components can be utilized, as desired. For example, the teachings herein can be applied to return air ducts as well as supply ducts. Likewise, the teachings herein can be applied to return or supply ducts for both furnaces and/or air-conditioning systems. As another example, the teachings herein can be applied to ducts that run vertically or horizontally through any space, not just an attic space.

[0023] The above-described embodiments of the invention are intended to be examples of the present invention and alterations and modifications may be effected thereto, by those of skill in the art, without departing from the scope of the invention which is defined solely by the claims appended hereto.

1. A house comprising:
- a base structure comprising a heat exchanger and an air duct connected to said heat exchanger;
- an attic structure above said base structure comprising at least one additional air duct connected to said heat exchanger via said air duct; and,
- a layer of foam insulation substantially continuously covering at least a portion of said at least one additional air duct.

2. The house of claim **1** wherein said foam insulation is sprayed polyurethane foam.

3. The house of claim **2** wherein said foam insulation is polyurethane closed cell foam.

4. The house of claim **2** wherein said foam insulation is open cell foam.

5. The house of claim **1** wherein said foam insulation covers an entire area of said attic structure.

6. The house of claim **1** wherein said air duct and said at least one additional air duct are supply ducts.

7. The house of claim **1** wherein said air duct and said at least one additional air duct are return ducts.

8. The house of claim **1** wherein said heat exchanger is a furnace.

9. The house of claim **1** wherein said heat exchanger is an air conditioning unit.

10. The house of claim **1** wherein said foam insulation is applied to a thickness that achieves an R value of about R32.

11. The house of claim **1** wherein said foam insulation is applied to a thickness that achieves an R value of about R40.

12. An attic structure comprising:
- a horizontal portion defining a ceiling in a space below said attic structure;
- at least one air duct running along said horizontal portion; and,
- a layer of foam insulation substantially continuously covering at least a portion of said at least one air duct.

13. The attic structure of claim **9** wherein said foam insulation is sprayed polyurethane foam.

14. The attic structure of claim **9** wherein said foam insulation covers an entire area of said attic structure.

15. The attic structure of claim **9** wherein said air duct is a supply duct.

16. The attic structure of claim **9** wherein said air duct is a return duct.

17. The attic structure of claim **1** wherein said foam insulation is applied to a thickness that achieves an R value of about R32.

18. The attic structure of claim **1** wherein said foam insulation is applied to a thickness that achieves an R value of about R40.

19. A method of constructing an attic comprising:
- constructing a horizontal portion of said attic defining a ceiling in a space below said attic structure;
- installing at least one air duct along said horizontal portion;
- covering at least a portion of said at least one air duct with a layer of foam insulation.

20. The method claim **16** wherein said foam insulation is sprayed polyurethane foam.

21. The method of claim **16** wherein said foam insulation covers an entire area of said attic structure.

22. The method of claim **16** wherein said air duct is a supply ducts.

23. The method of claim **16** wherein said air duct is a return ducts.

24. The method of claim **16** wherein said foam insulation is applied to a thickness that achieves an R value of about R32.

25. The method of claim **16** wherein said foam insulation is applied to a thickness that achieves an R value of about R40.

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