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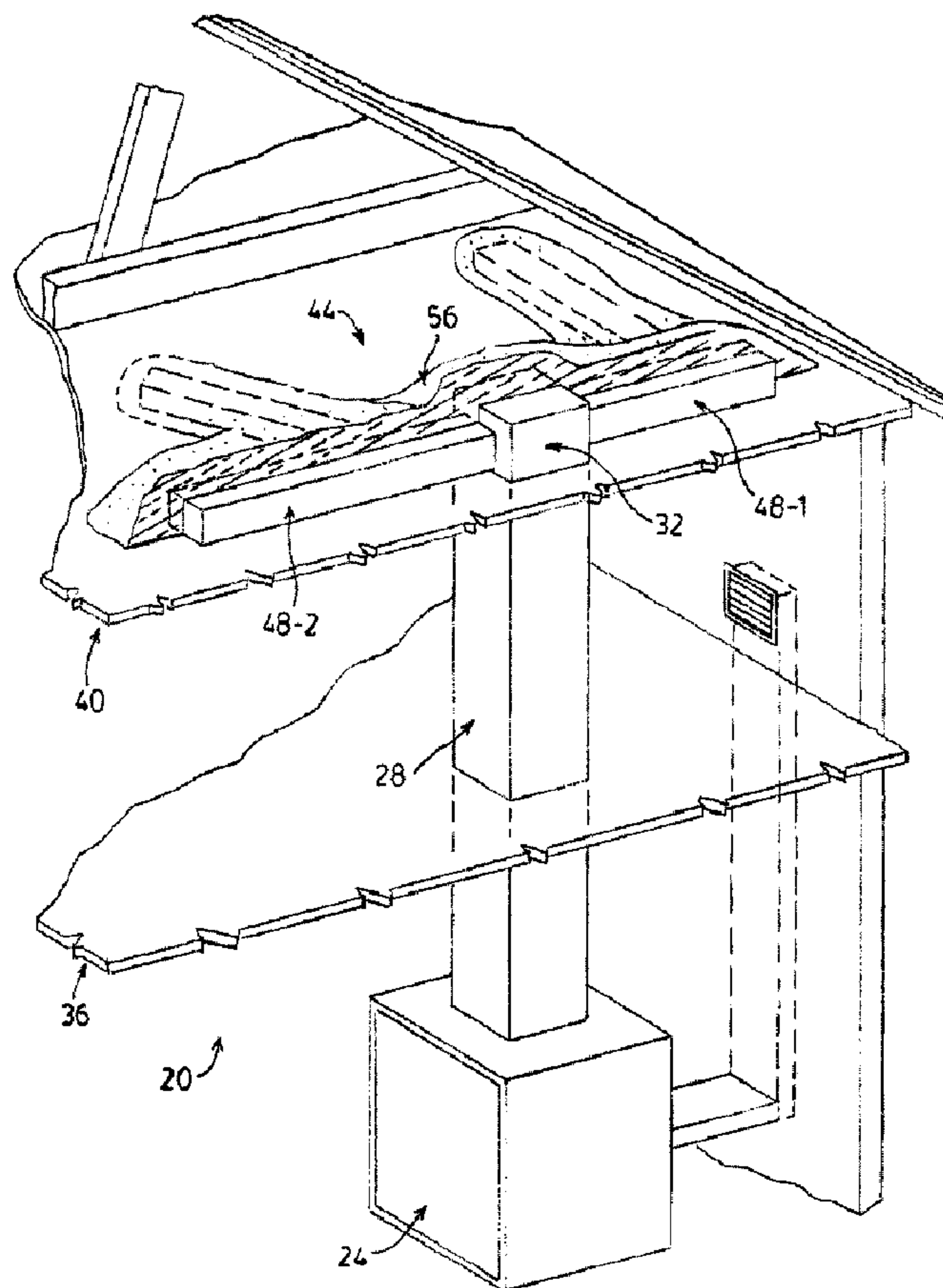
(72) Inventeurs/Inventors:  
GILGAN, PETER, CA;  
MITCHELL, WALTER, CA

(73) Propriétaire/Owner:  
THE MATTAMY CORPORATION, CA

(74) Agent: PERRY + CURRIER

(54) Titre : METHODE D'ISOLATION ET DE CONFIGURATION DES CONDUITS D'AIR

(54) Title: INSULATING METHOD AND DUCTING CONFIGURATION



(57) Abrégé/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.



## ABSTRACT OF DISCLOSURE

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.

## INSULATING METHOD AND DUCTING CONFIGURATION

### FIELD OF THE INVENTION

**[0001]** 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

**[0002]** 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.

**[0003]** 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.

**[0004]** 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

**[0005]** 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.

**[0006]** 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.

**[0007]** The foam insulation can be sprayed polyurethane foam.

**[0008]** The foam insulation can cover an entire area of the attic structure.

**[0009]** The air duct and the at least one additional air duct can be supply ducts or return ducts.

**[0010]** The heat exchanger can be a furnace and/or an air conditioning unit.

**[0011]** 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.

**[0012]** 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

**[0013]** Figure 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.

**[0014]** Figure 2 is a sectional view of the home of Figure 1.

## DETAILED DESCRIPTION OF THE EMBODIMENTS

**[0015]** Referring now to Figures 1 and 2, a portion of a home is indicated generally at 20. As seen in Figure 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 unit can be an air-conditioner and/or a combination of a furnace and air-conditioner.

**[0016]** 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.

**[0017]** 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.

**[0018]** 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 Figure 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.

**[0019]** 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.

**[0020]** 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.

**[0021]** 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.

**[0022]** 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.

## CLAIMS

## 1. A house comprising:

a base structure comprising a heat exchanger located on a lower floor of said house and a supply duct connected to said heat exchanger, said supply duct passing through an interior section of said house and through a ceiling of an upper floor of said house, without venting to said interior section, away from exterior walls of said house to reduce transfer from an interior of said supply duct and an exterior of said house;

an attic structure above said base structure comprising at least one additional supply duct connected to said heat exchanger via said supply duct and running along said ceiling; and,

a layer of sprayed polyurethane foam insulation substantially continuously covering an entire area of said attic structure including said at least one additional air duct.

2. The house of claim 1 wherein said polyurethane foam insulation is closed cell foam.

3. The house of claim 1 wherein said polyurethane foam insulation is open cell foam.

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

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

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

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

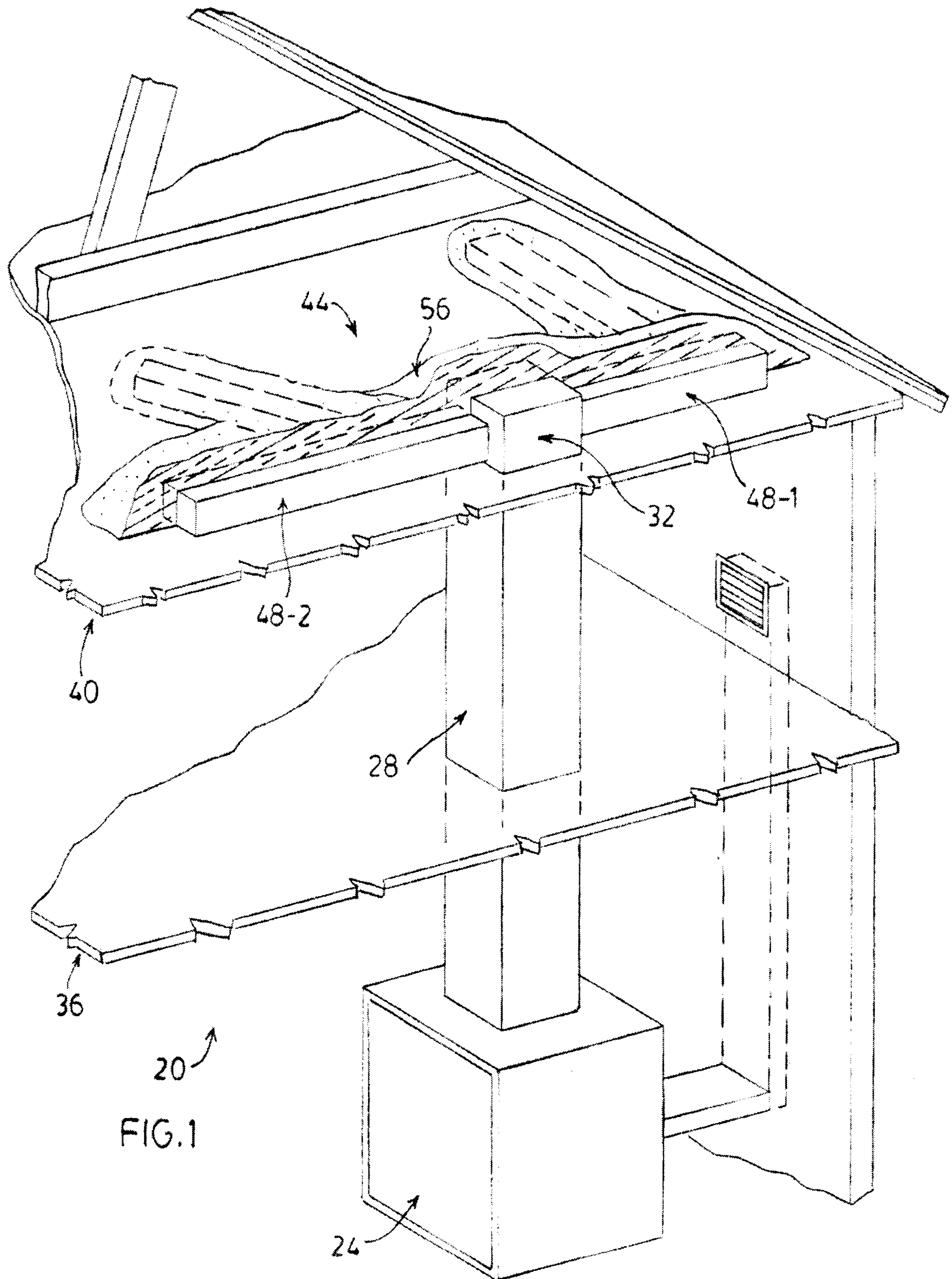


FIG. 2

