July 13, 1948. S. J. BENN 2,445,102

HUMIDITY MODIFYING AND HEAT CONSERVING MEANS

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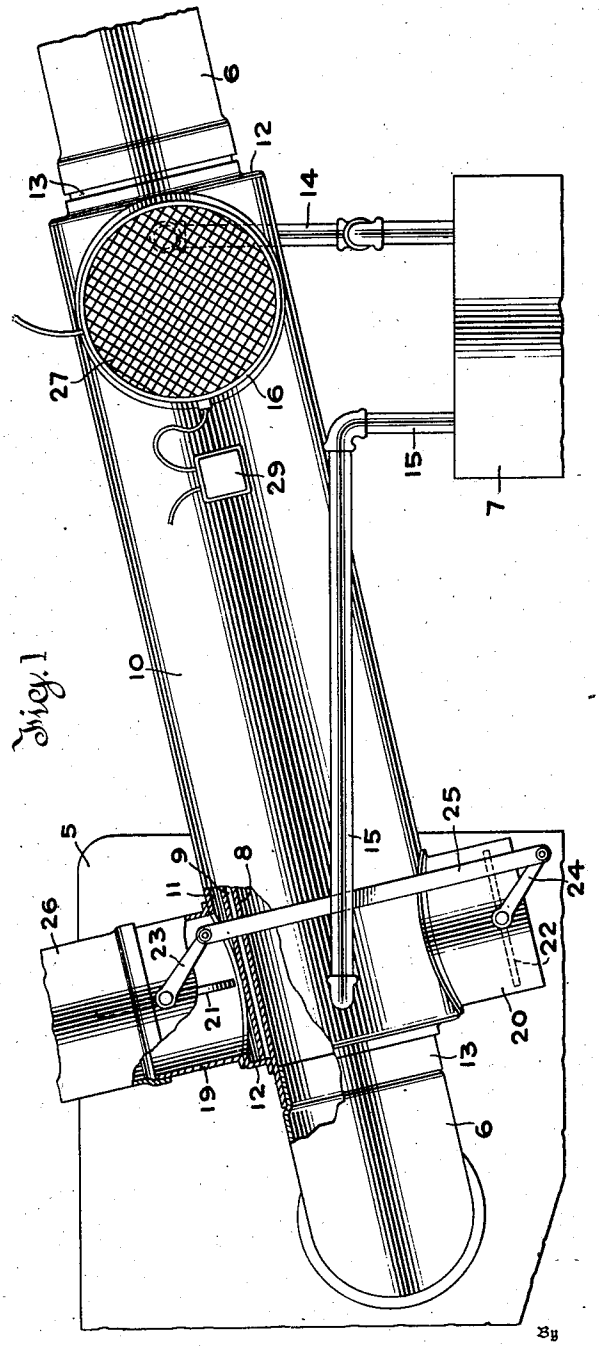


Fig. 1

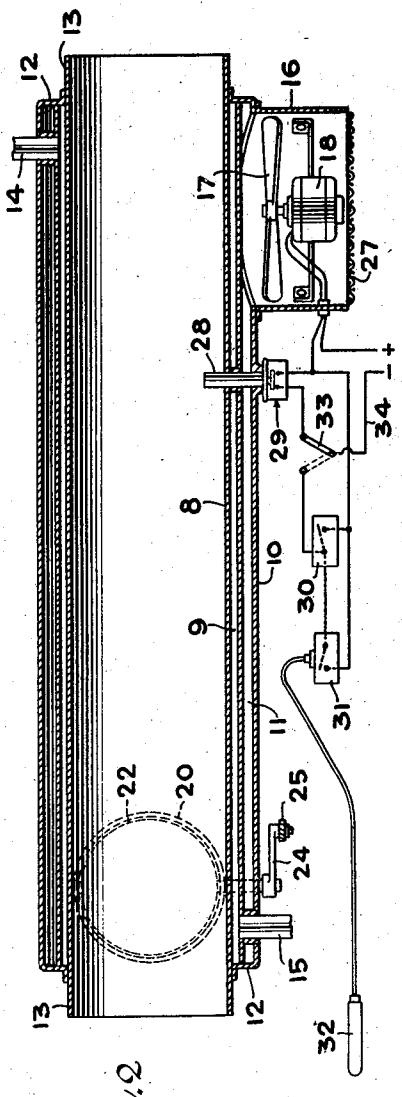


Fig. 2

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Fig. 3

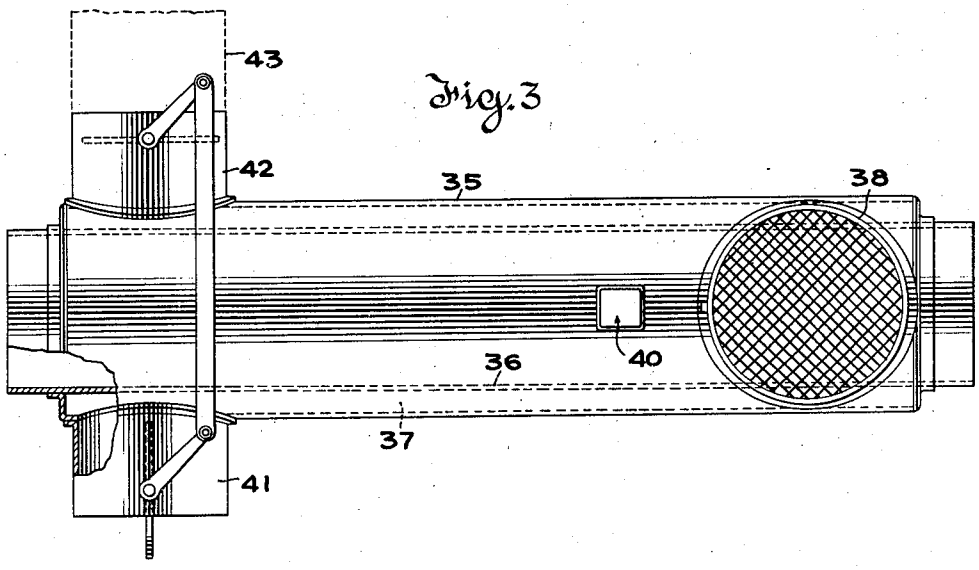
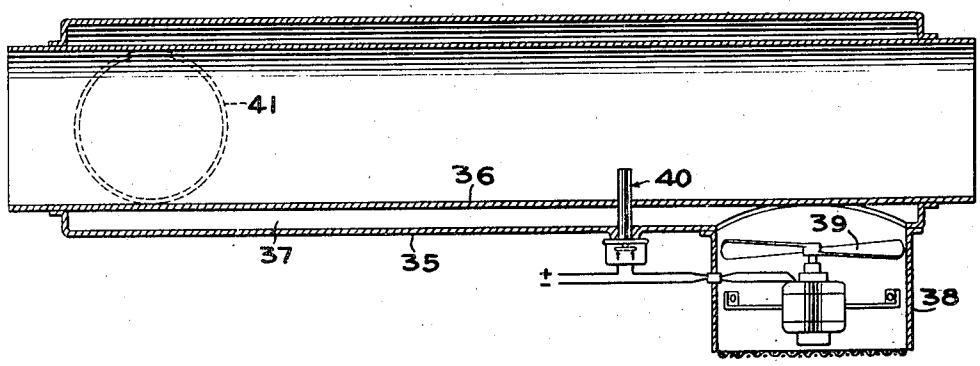


Fig. 4



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HUMIDITY MODIFYING AND HEAT CONSERVING MEANS

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9 Claims. (Cl. 236—44)

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This invention relates to humidity modifying and heat conserving means particularly adapted to controlling the humidity in cellars, basements, or other rooms or compartments having a poor circulation of air.

It is a well known fact that deterioration in buildings is greatest in cellars and basements, and that this is due to poor ventilation with consequent deposit and accumulation of moisture on the structural elements. This is particularly true in summer time when the temperature of such places is much lower than that of the outside atmosphere which is more or less laden with moisture. Consequently, as this humid air enters the cellar or basement, the moisture is precipitated or accumulates upon the walls and other portions, which results in rapid deterioration, molding and decay. This is also true to a degree in other seasons of the year, depending largely upon the relative climatic conditions.

The primary object of this invention is to provide means for modifying the atmospheric conditions in the cellar or basement either to substantially equalize the temperature with that of the outside atmosphere, as in summer time, or to maintain a circulation of comparatively dry air in other seasons, so as to prevent the deposit of moisture, as above mentioned.

A further object of this invention is to utilize the heating apparatus usually installed in the cellar or basement for accomplishing the above stated purposes, by equipping the same with a comparatively inexpensive attachment.

A further object of the invention is to provide a device for the purpose mentioned which will not only maintain proper atmospheric conditions in the cellar, but which will also conserve heat, and thereby fuel, by utilizing a large portion of the heat from the heating apparatus which is usually dissipated up the flue and lost.

A further object of the invention is to provide a device for the purposes stated which shall be of such construction and arrangement of parts that it may serve to augment the heating of the water for the domestic hot-water storage heater with which practically all modern dwellings are equipped.

Other objects will appear hereinafter.

With these objects in view, this invention consists generally in providing a drum about a heated conduit which derives its heat from a heating unit installed in the cellar, and having means associated with said drum for circulating the air of the cellar through said drum and then discharging the heated and dried air into the cellar.

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The heated unit mentioned may be either a section of the flue pipe leading from the main heater to the chimney, which may be utilized during the colder seasons; or a hot water conduit in circulatory connection with the domestic heater, which may be used during the summer. Preferably, I combine both in one unitary construction whereby the device will be operable for the purposes designated throughout all seasons of the year, and when the general heating plant is in operation, the device will serve to augment the heating of the domestic water for the storage heater, thereby conserving fuel used for heating the latter.

The invention further consists in a device as mentioned, equipped with means for automatically setting the same into operation by the prevailing conditions of heat or humidity, or both.

The invention further consists in various arrangements and combinations of parts, all as will be fully described hereinafter and particularly set forth in the appended claims.

The invention will be more readily understood by reference to the accompanying drawings forming a part of this application, and in which:

Figure 1 is an elevation illustrating the invention in one example of embodiment.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is an elevation of a modified and simplified form of the invention.

Figure 4 is a section on the line 4—4 of Figure 3.

Referring now to the drawings, 5 indicates the heater unit of a heating plant having the usual flue pipe 6 connecting said unit with a chimney, not shown; and 7 indicates a domestic hot water storage heater with which the majority of modern dwellings are equipped. Interposed in the flue pipe, hereinafter designated as the "flue," is the device embodying the invention.

In the form of the invention as illustrated in Figures 1 and 2, a portion of the flue is replaced by a similar tubular flue section 8 having a water jacket 9 which in turn is surrounded by a drum 10 providing an air space 11. The water jacket 9 and drum 10 are preferably coextensive in length, and their ends are closed by walls 12—12 spaced inwardly from the ends of the flue section 8. The projecting ends 13 of the flue section 8 thus formed provide means for attaching the adjacent ends of the flue pipe 6, as clearly shown in Figure 1.

The flue section 8 and its surrounding water jacket 9 and air drum 10 are preferaby inclined,

with the end remote from the heater being the higher, and above the level of the top of the domestic water heater. Extending from the domestic water heater 7 to the upper end of the water jacket 9 is an inlet pipe 14, and from the lower end of the water jacket a return pipe 15 is provided for completing the circuit between the heater 7 and the jacket. By this arrangement, a circulation of hot water is maintained through the jacket 9 when the domestic hot water heater is in operation, and the air in the drum 10 is heated therefrom.

In order to utilize the heated air in the drum 10 for the purposes of this invention, means for producing a forced draft therethrough is provided, and also means for directing the heated air where needed. To this end the drum is provided adjacent one end with a housing 16 communicating with the air space 11 and having its outer end open to the cellar. Within the housing is a fan 17 actuated by a motor 18. At the opposite end of the drum from the fan housing 16 is a pair of discharge openings defined by collars 19 and 20 extending upwardly and downwardly, respectively. Each discharge opening is provided with a control damper 21 and 22, respectively, mounted on their transverse axes and equipped with actuating arms 23 and 24 connected by a link 25, so arranged that as one damper is opened, the other damper is closed, so that the dried and heated air may be directed upwardly toward the ceiling rafters or downwardly toward the floor. If desired, the dampers may be adjusted to discharge the hot air simultaneously from both openings and in the desired proportions. If preferred, the upper collar 19 may be connected to a pipe 26 leading to a remote part of the cellar, or to another compartment or room in the cellar, or to the floor above. A screen 27 may be provided at the outer open end of the fan housing for obvious reasons.

Means are provided for automatically closing and opening the circuit to the fan according to the conditions prevailing in the cellar. To this end a thermostat 28 is provided in the circuit and extended into the flue section 8. This thermostatic control is set to operate a switch 29 when the flue gases reach a desired temperature; from 80° to 100° F. being found satisfactory. Obviously, this thermostatic control 28—29 is for use in cold weather when the general heating plant 5 is in use. At such times, when the flue gases reach the temperature to which the thermostat is set, the circuit to the fan motor 18 is closed and the fan will draw in the air from the cellar through the outer open end of the housing 16 and force it through the air jacket space 11 to the discharge openings 19—20 from which it may be directed as desired by adjusting the dampers 21—22. As the domestic water heater is always supplied with hot storage water, this hot water will continuously circulate through the water jacket 9, heating the air in the drum 10. In cold weather, when the heater 5 is in operation, the water in the jacket 9 and the air in the space 11, also, are heated by the stack or flue gases, which is particularly desirable at such times.

In warm weather, when the heater 5 is not in operation, the heating and drying of the air is accomplished solely by the heat from the hot water jacket 9, and it will be obvious that other means than the thermostat 28 must be provided for automatically opening and closing the circuit to the fan. To this end it is preferable to arrange in the circuit of the fan motor, a switch actuated by a humidostat located in the cellar, and another switch actuated by a thermostat sensitive to the outside temperature so that the fan will be started whenever an excess of humidity is present in the cellar; or when the outside temperature varies sufficiently from the cellar temperature to produce conditions whereby moisture may be deposited. The first is to cure a condition which exists; the second is largely a preventative. While it is desirable to equip the system with both means of control, it is obvious that either may be used alone and the other omitted.

In the drawings, 30 indicates the humidostat controlled switch and 31, the thermostatic switch, the bulb or sensitive portion 32 of which is arranged outside the building. As the switches 30 and 31 are used at times when the switch 29 is not operable, and vice versa, a selector switch 33 is provided in the power line 34 whereby either the switch 29 or switches 30 and 31 may be thrown into the fan motor circuit. While a circuit is illustrated for accomplishing this end, any other arrangement of the circuit may be used as found desirable. It is believed that the operation of the device will be obvious from the above description.

In Figures 4 and 5 is illustrated a modified form of the invention wherein the water jacket 9 is omitted. In this form, the drum 35 is mounted directly on the flue section 36 without the interposition of the water jacket, so that the air in the space 37 is heated directly from the flue section. The drum is provided with the housing 38 and fan 39 as in the first described form, and the fan is controlled by the thermostat 40 projecting through the drum into the flue section as illustrated. As the fan circulates the air rapidly through the restricted air space 37 in close contact with the flue section, a great amount of heat is imparted to the air, which may be ejected from the lower outlet 41 into the cellar or may be driven through upper outlet 42 and the pipe 43 into another compartment of the cellar or into a room on a floor above, thus conserving a large amount of heat that would otherwise be lost.

Various modifications and changes in the herein disclosed structure may occur to those skilled in the art to which the invention relates, and the invention should be considered as limited only by the spirit and scope defined in the appended claims.

I claim:

1. In a humidity modifying and heat conserving means for basements, a flue section, a water jacket and an air drum surrounding said flue section, a storage hot water heater, means for connecting said water jacket in circulatory communication with said storage hot water heater, means at one end of said drum for forcing air from the basement therethrough to heat and dry said air, said drum being provided adjacent the opposite end with a pair of discharge openings, a damper for each of said openings, and means connecting said dampers whereby upon opening one damper the other will be closed.

2. In a humidity modifying and heat conserving means for basements, a flue section, a water jacket and an air drum surrounding said flue section, a storage hot water heater, means for connecting said water jacket in circulatory communication with said storage hot water heater, means at one end of said drum for forcing air from the basement therethrough to heat and

dry said air, said drum being provided adjacent the opposite end with a pair of discharge openings, a damper for each of said openings, means connecting said dampers whereby upon opening one damper the other will be closed, and means associated with each of said openings for directing the heated air to the localities desired.

3. In a humidity modifying and heat conserving means for basements, a flue section, a water jacket and an air drum surrounding said flue section wholly within the basement, a storage hot water heater, means for connecting said water jacket in circulatory communication with said storage hot water heater, means at one end of said drum for forcing air from the basement therethrough to heat and dry the air, said drum being provided adjacent the opposite end with a discharge opening leading back into the basement, and means automatically responsive to a demand for relief of humidity in the basement for actuating said air forcing means.

4. In a humidity modifying and heat conserving means for basements, a flue section, a water jacket and an air drum surrounding said flue section, a storage hot water heater, means for connecting said water jacket in circulatory communication with said storage hot water heater, a fan for forcing air through said drum, said drum having an outlet, means adapted to be actuated by the temperature within said flue section for controlling said fan, means adapted to be actuated by the humidity in the basement, and other means controlled by the outside temperature for controlling said fan, and selective means for connecting the first said controlling means or the last two said controlling means to the actuating means for the fan.

5. In a humidity modifying and heat conserving means for basements, a flue section, a water jacket and an air drum surrounding said flue section, a storage hot water heater, means for connecting said water jacket in circulatory communication with said storage hot water heater, a fan for forcing air through said drum, a motor for said fan, a circuit for said motor, a switch in said circuit, a thermostat in said flue section for actuating said switch, a second switch in the circuit actuated by the humidity in the basement, a thermostatic switch actuated by the outside temperature, and a selective switch for connecting either the first said switch or the two last mentioned switches in the circuit to the motor.

6. In a humidity modifying and heat conserving means for basements, a flue section, a water jacket and an air drum surrounding said flue section, a storage hot water heater, means for connecting said water jacket in circulatory communication with said storage hot water heater, a fan for forcing air through said drum, a motor for said fan, a circuit for said motor, a switch in said circuit, a thermostat in said flue section for actuating said switch, a second switch in the circuit actuated by the humidity in the basement,

and a selective switch for connecting either the first said switch or the second switch in the circuit to the motor.

7. In a humidity modifying and heat conserving means for basements, a flue section, a water jacket and an air drum surrounding said flue section, a storage hot water heater, means for connecting said water jacket in circulatory communication with said storage hot water heater, a fan for forcing air through said drum, a motor for said fan, a circuit for said motor, a switch in said circuit, a thermostat in said flue section for actuating said switch, a thermostatic switch actuated by the outside temperature, and a selective switch for connecting either the first said switch or the thermostatic switch in the circuit to the motor.

8. A heater unit having a flue pipe and a domestic storage water heater, in combination with a water jacket and an air drum surrounding a section of said flue pipe, said flue section, water jacket and air drum being inclined upwardly and located within a compartment of a building, an inlet pipe connecting the storage heater with the upper end of said water jacket, a return pipe from the lower portion of said jacket to said storage heater, a motor driven fan for forcing air through said drum, a motor for said fan, a switch controlling the circuit to said fan, and means actuated by the atmospheric conditions outside said building for operating said switch.

9. In apparatus device of the class described, a flue section, a water jacket and an air drum surrounding said flue section, a storage hot water heater, means for connecting said water jacket in circulatory communication with said storage water heater, a housing on said drum adjacent one end thereof and open at its outer end, a motor driven fan in said housing, the opposite end of said drum from said housing having a pair of discharge openings, a conduit leading from one of said openings, a damper for each of said openings, and means connecting said dampers whereby when one damper is opened the other will be closed.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,214,047	McGinnis	Jan. 30, 1917
1,266,455	Gordon	May 14, 1918
1,325,276	Corcoran	Dec. 16, 1919
1,349,482	Wood	Aug. 10, 1920
1,425,314	Bentz	Aug. 8, 1922
1,740,626	Petrelli	Dec. 24, 1929
1,755,924	Keagle et al.	Apr. 22, 1930
1,799,702	Puening	Apr. 7, 1931
1,801,057	Samels	Apr. 14, 1931
2,348,835	Mueller	May 16, 1944