April 9, 1929. A. O. MILLER 1,708,550

AIR CIRCULATING MEANS FOR HEATING SYSTEMS

Filed July 28, 1926

Fig. 1

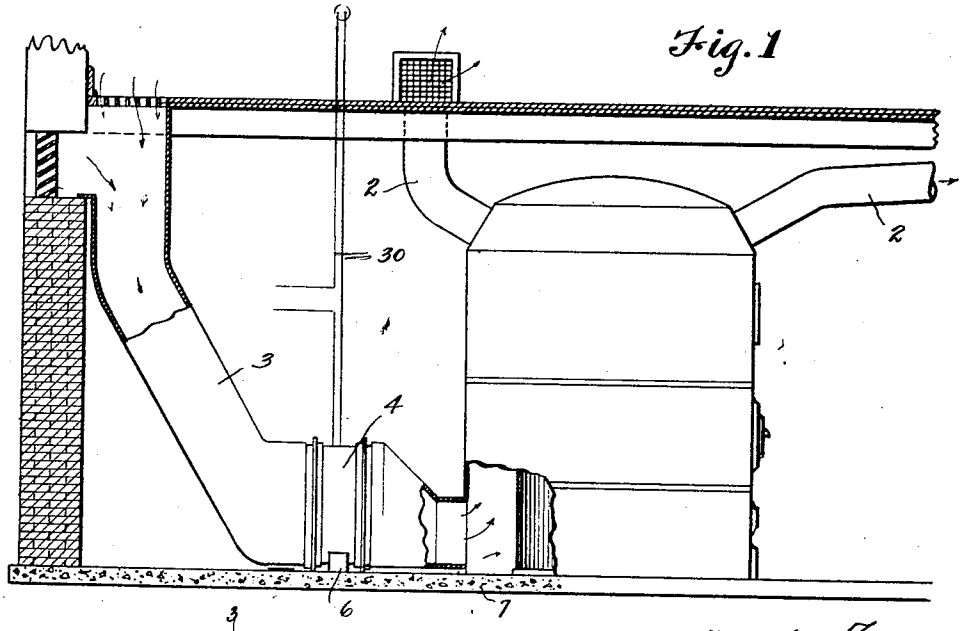


Fig. 2

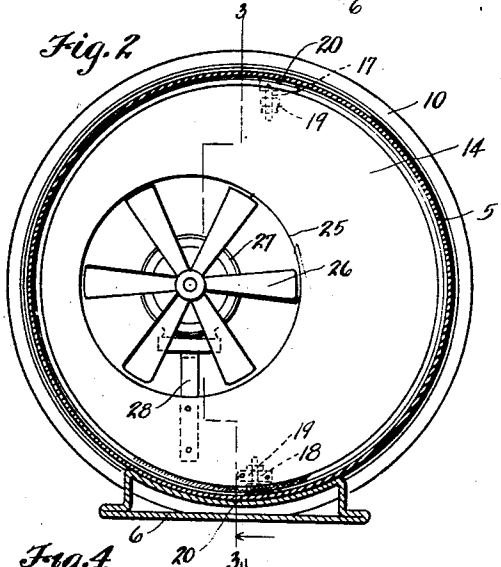


Fig. 3.

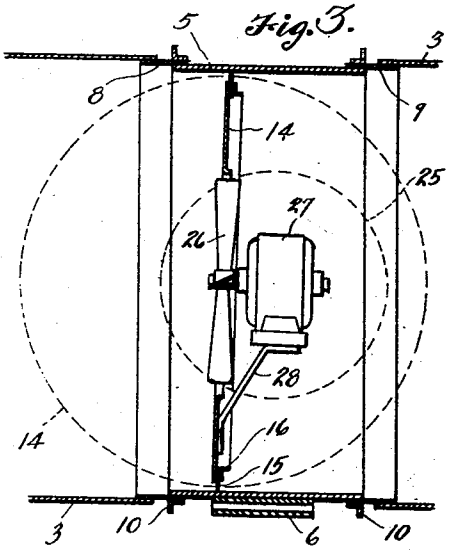


Fig. 4

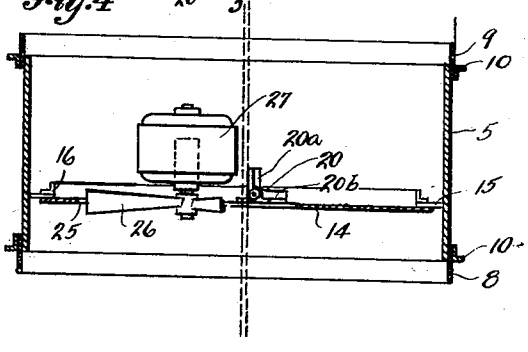
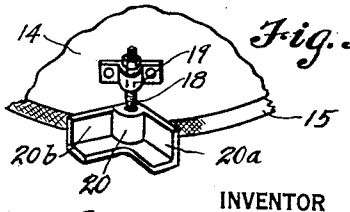


Fig. 5



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UNITED STATES PATENT OFFICE.

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AIR-CIRCULATING MEANS FOR HEATING SYSTEMS.

Application filed July 28, 1926. Serial No. 125,434.

This invention relates to improvements in hot air heating plants and more particularly to mechanical means for creating a forced circulation of air through the heating drum and from the distributing pipes.

In the usual types of hot air heating plants, it is frequently difficult to cause the air to circulate through the heater and to the rooms to be heated with sufficient rapidity to obtain the full efficiency of the plant. This is especially true at times when the direction of the wind out of doors is adverse to that at which the heated air is required to travel in reaching a room. It is also true where the heated air is required to travel through a long pipe with little upward slope.

In view of the above difficulties, it is the object of this invention to provide mechanical means for creating a forced circulation of air when such is desired so that rooms that are remotely located from a furnace may be quickly heated, whereby the hindrance to heating because of an adverse direction of wind may be overcome and whereby the time required for completely and evenly heating a room or building is reduced to a minimum.

Specifically stated, the object of the invention resides in the provision of an air circulating device, for use in connection with hot air heating plants, that is provided as a unit construction and adapted to be interposed in the cold, or fresh air pipe leading to the heating plant and wherein there is a damper adapted to swing between open and closed positions and provided with an eccentric opening in which a motor driven blower fan is located as the means for creating the forced circulation of air; the damper being so mounted as to swing under its own weight, to open position when the blower is not operating and to swing to closed position incidental to the pull of the fan in operation.

Another object of the invention is to provide a device of the above character in which the noise of vibration incidental to operation of the fan is deadened so that the device is practically noiseless and non-resonant.

Other objects of the invention reside in the various details of construction, and combination of parts, hereinafter described.

In accomplishing these and other objects, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Figure 1 is a view showing a hot air heating system in which the cold air conduit is equipped with a mechanical air circulating unit in accordance with details of the present invention.

Figure 2 is a cross sectional view through the unit showing the damper and eccentric location of the blower fan in the damper.

Figure 3 is a cross section taken substantially on the line 3—3 in Figure 2.

Figure 4 is a horizontal section centrally through the unit.

Figure 5 is a detail view of one of the damper mountings.

Referring more in detail to the drawings— 1 designates any suitable construction of hot air furnace, one of the convenient forms being shown having the usual warm air distributing pipes 2 that may lead to the various rooms of a building, and the cold air, or re-circulating, pipe 3 leading from one of the rooms to be heated and if desired opening to the outside of the building as shown, into the lower portion of the heater, as shown in Figure 1; the circulation of air being downward through pipe 3, into the heater 1 and out through the several pipes 2 to the various rooms of the building.

In accordance with the present invention, means is provided for mechanically creating a forced circulation of air when such is desired and this means is embodied in a unit construction designated at 4, in Figure 1, which is interposed in the cold air pipe adjacent the furnace. The unit comprises a cylindrical drum 5 fixedly attached to a base bracket 6 which may be bolted or otherwise secured to the floor 7. About the ends of the drum are secured heavy fabric, sleeve-like extensions 8 and 9 adapted to fit snugly within the adjacent ends of the cold air pipe sections between which the unit is interposed. These fabric extensions not only conform readily to the shape of the end sections within which they are fitted and provide air-tight joints but are primarily for the purpose of rendering the device non-resonant and thereby deadening the sound of vibration of the drum when the fan is in operation.

For the purpose of strengthening and stiffening the drum 5, angle iron bands 10 are secured about its ends with the inner ends of the fabric sleeves 8 and 9 disposed beneath the bands as shown in Figures 3 and 4. The bands preferably are secured by rivets that extend through the bands, sleeves and ends of the drum.

Pivotally mounted within the drum 5 is a damper 14 of circular form provided about its periphery with a heavy fabric extension 15 secured to the damper beneath an angle iron stiffening ring 16. The damper is pivotally supported to swing between closed and open positions by means of pivots 17 and 18 fixed, respectively, to its upper and lower edges. The lower pivot 18 is placed slightly to one side of the vertical center of the damper and the upper pivot is located a little more to the side of the vertical center and also is offset in the axial direction of the drum so that the damper is mounted in a leaning position as shown in Figure 3. The pivots are threaded through lugs 19 fixed to the damper plate and may be adjusted and held by suitable lock nuts. At their ends they are tapered to fit in sockets provided in pieces 20 fixed to the walls of the drum. The lower piece 20 is of right angular form with one leg 20^a extended in the axial direction of the drum to serve as a stop against which the lower edge of the damper may swing to limit its opening movement and the other leg 20^b is disposed transversely to the drum to check the closing swing of the damper.

Provided in the damper at one side of the center is an opening 25, and located within the opening is a blower fan 26 fixed on the shaft of an electric motor 27 mounted by a resilient bracket 28 that is fixed to the damper plate below the opening. Electric current for the motor is supplied through wires 30 extended thereto through the top of the drum. The fan opening is located in the damper plate at that side of the vertical center opposite that toward which the pivot points are offset and the motor is supported at that side of the damper toward which its top edge leans so that the weight of the motor will, when the fan is not in operation, cause the damper to swing automatically to open position to permit a natural flow of air through pipe 3 to the furnace. However, as soon as the fan is set in motion, it operates to drive air into the furnace and the pull of the fan, incidental to eccentric location in the opening, causes the damper to swing to closed position so that there can be no back flow of air about the fan.

With the device so constructed and assembled with the air pipe 3, the damper normally would be disposed in open position to allow air to flow naturally to the furnace, but in the event that it was desired to quickly heat a room or if it should be desired to force a circulation of air, the motor is then started. This rotates the fan and the pull of the fan in forcing the air to the furnace, swings the damper to closed position to prevent any back flow or short circuiting about the fan. When the fan is stopped, the damper again swinging to open position.

While specific embodiments of the invention are herein illustrated, it is to be understood that the invention is applicable for use generally with the various kinds of hot air furnaces and that changes in detail can be made without departing from the spirit of the invention.

I claim—

1. In an air circulating pipe, a damper adapted to swing between open and closed positions and an air circulating means fixed to the damper to move bodily therewith and whereby the damper will be moved from open to closed position incident to operation of said means.

2. In an air circulating pipe, a damper pivotally mounted so as to normally rest in open position and adapted to swing forwardly to closed position, and provided with an opening therethrough, an air circulating means including a fan supported from the damper in said opening and adapted, incidental to forward pull exerted by the fan when in operation to move the damper to closed position.

3. In an air circulating pipe, a damper pivotally mounted so as to normally rest in open position, and provided with an eccentric opening, a blower fan mounted in the opening and adapted, incidental to operation to move the damper to and retain it in closed position.

4. In an air circulating pipe, a damper having supporting pivots at top and bottom edges which are offset with respect to each other in such manner that the damper will, under its own weight, swing to open position, said damper having an opening therethrough offset laterally from the line between pivot points and a blower fan mounted in said opening adapted, incidental to operation, to swing the damper to closed position.

5. In an air circulating pipe, a damper having supporting pivots at its top and bottom edges offset laterally from the vertical axis of the damper and offset with respect to each other in the axial direction of the pipe so that the damper will swing of its own weight to open position, a laterally offset opening through the damper, a motor driven fan supported from the damper in the said opening and adapted, incidental to operation, to swing the damper to closed position.

6. In an air circulating pipe, a damper mounted by upper and lower pivots in said pipe to swing between open and closed positions, and having a laterally offset opening therein, a stop for limiting the closing and opening swing of the damper; the pivots of said damper being offset with respect to a vertical line and from the axis of the damper so that the damper will swing of its own weight to open position, a resilient bracket fixed to the damper below the opening, an electric motor mounted by the bracket, a blower fan supported by the motor shaft in said opening and adapted, incidental to op-

eration, to swing the damper to closed position.

7. In an air circulating pipe, a cylindrical drum interposed between adjacent sections of said pipe and embodying a pivotally mounted damper and air circulating means mounted on the damper; said damper having a fabric peripheral extension for engaging the drum surface and said drum ends being connected with the ends of said pipe sections by means of fabric sleeves.

Signed at Seattle, Washington, this 17th day of May, 1926.

ALLEN O. MILLER.