

June 17, 1930.

A. R. TEARE

1,764,704

HEATING AND VENTILATING APPARATUS

Filed June 18, 1928

2 Sheets-Sheet 1

FIG.-1

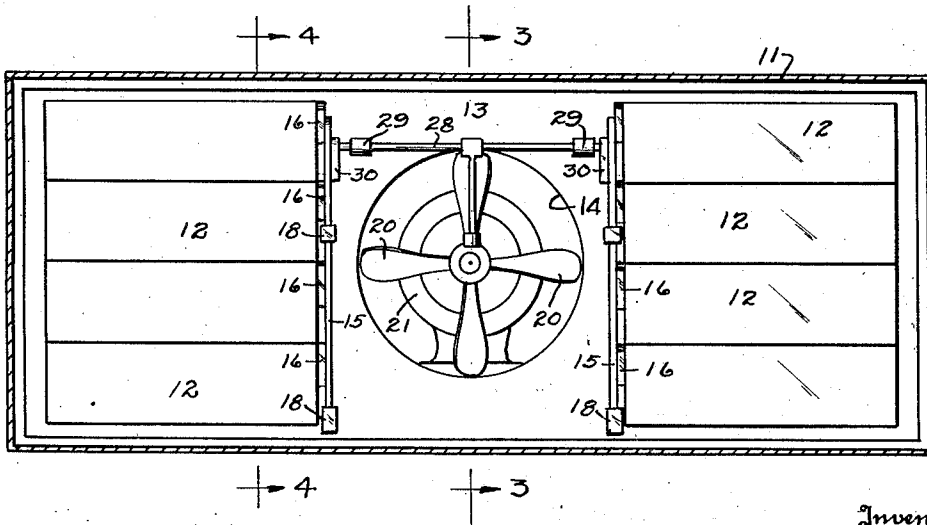
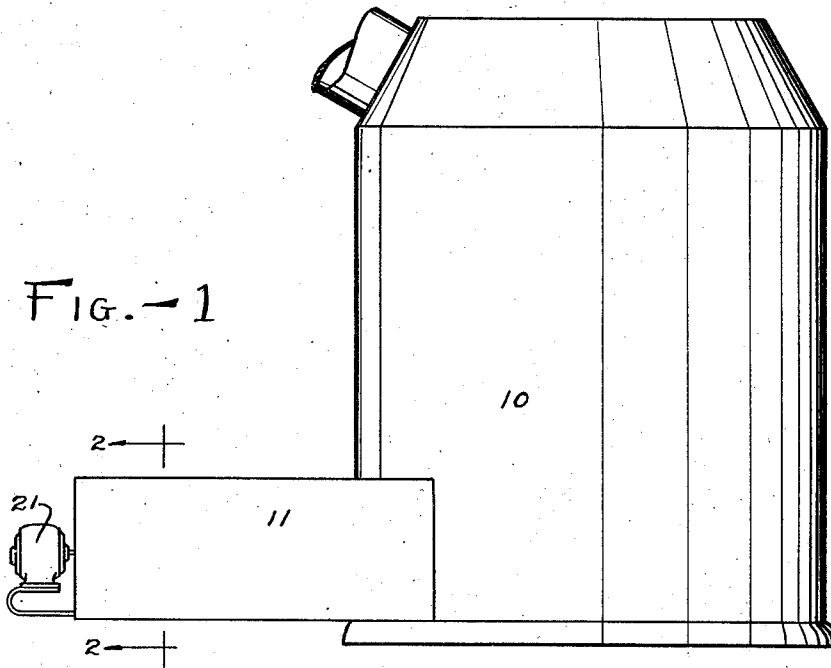


FIG.-2

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2 Sheets-Sheet 2

FIG.-3

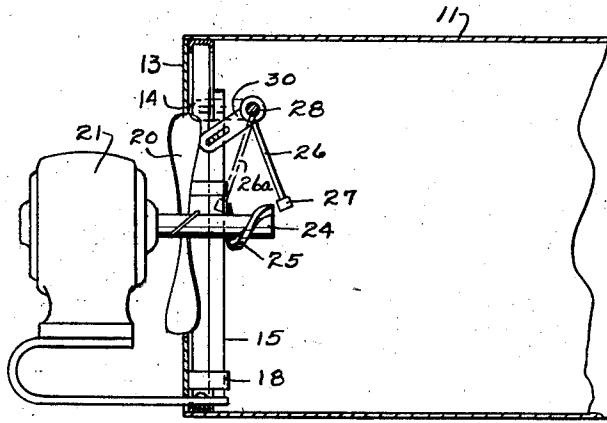


FIG.-4

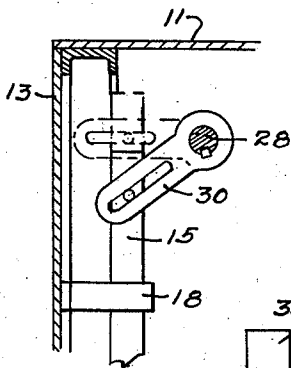
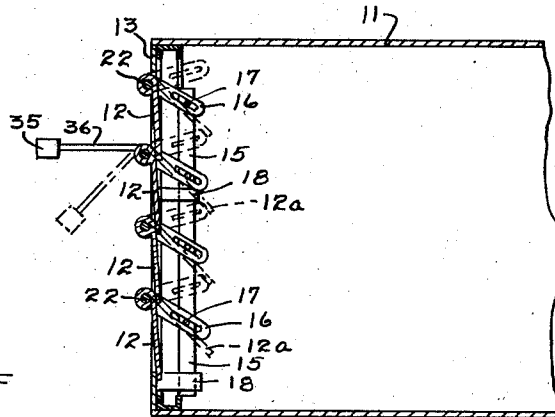


FIG.-5

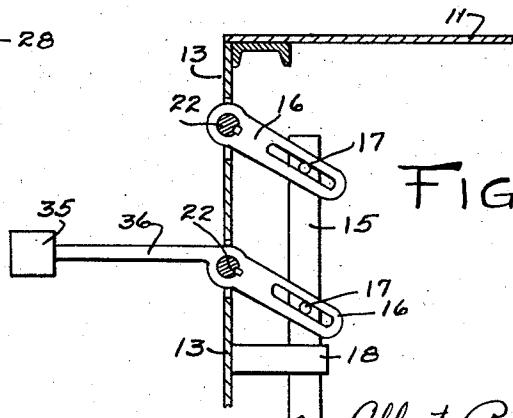


FIG.-6

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UNITED STATES PATENT OFFICE

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HEATING AND VENTILATING APPARATUS

Application filed June 18, 1928. Serial No. 286,336.

This invention relates to heating and ventilating apparatus, particularly that which is intended for use in connection with the operation of a hot air heating furnace. In order to insure positive and uniform distribution of air from the furnace through the various delivery pipes and into the rooms to be heated, it is advantageous to utilize a fan which is placed at or near the inlet to the heating chamber of the furnace and to operate the fan at certain intervals. Ordinarily a certain area of inlet opening is required to maintain an adequate volume of air through the heating chamber under the gravity system. Accordingly, if a fan is placed in the opening, provision must be made for allowing all of the air entering the chamber to be forced therein through the fan opening when the fan is in operation, and provision must also be made for providing adequate opening area when the fan is stopped, so as to prevent the furnace from being burned out.

The principal object of the present invention is to provide an apparatus which is adapted to be used in connection with the operation of a hot air heating furnace to change the furnace from a gravity system to a forced air system. An additional object is to construct an apparatus which may be readily installed on existing furnaces and which may be quickly and easily actuated to effect the change from one system to the other.

A further object of the present invention is to make an apparatus which, when installed in a furnace room, may be readily controlled at a remote point. In addition, my invention contemplates the provision of an apparatus which when not in operation allows sufficient area of opening for the satisfactory operation of the furnace under the gravity system, thus avoiding a burning out of the furnace.

Moreover, the arrangement of the apparatus is such, that all of the air flowing into the chamber must flow through the fan opening when the fan is in operation, thus enabling the volume and pressure to be definitely controlled.

The invention set forth herein is not only adapted for use in connection with the furnace having an air inlet passageway opening into the furnace room, but is also adapted to be used in connection with the operation of a furnace, wherein the inlet passageway is connected to a riser through which air enters the heating chamber from the rooms which are heated.

Referring to the drawings, Fig. 1 is a side elevation of a hot air heating furnace embodying my invention; Fig. 2 is a vertical section of the apparatus illustrating my invention and showing the damper in closed position and taken along line 2-2 on Fig. 1; Figs. 3 and 4 are vertical sections through the apparatus and are taken on planes indicated by the correspondingly numbered lines in Fig. 2; and Figs. 5 and 6 are detailed enlarged sectional views of the damper actuating mechanism.

The hot air heating furnace illustrated embodies a heating chamber 10, having an air inlet conduit 11 leading thereto. Such conduit in the form shown opens directly into the room in which the furnace is located. The cross-sectional area of the conduit is such that sufficient air may enter the heating chamber to provide adequate circulation under the gravity system. A fan indicated at 20 is arranged to be driven by an electric motor 21 and is used for changing the system from a gravity to a forced air type.

In the preferred form, the fan is mounted adjacent an opening 14 in a frame 13. The fan opening is considerably smaller than the cross sectional area of the conduit, and hence provision is made for utilizing movable dampers which, when open, allow sufficient area for movement of air in a satisfactory manner under the gravity system. Such dampers are indicated, in general, at 12 as comprising a plurality of plates which are pivotally mounted, as at 22, to the frame. The plates, when closed overlap, as is shown in the full line position in Fig. 4. The open position is indicated by the broken lines 12^a in the same figure.

It is intended that the dampers be main-

tained normally in the open position when the fan is stopped, and that they be positively closed when the fan is started. To this end, each plate is illustrated as having an arm 16, which is connected by a pin and slot connection 17 to a bar 15. The bar is slidably mounted for vertical movement in bearings 18 on the frame. A counter weight 35 on an arm 36 is illustrated at Fig. 4 and functions to urge the dampers normally to open position.

The movement of the dampers from open to closed position is accomplished, in a preferred manner, by mechanism which is actuated upon substantially the first revolution of the fan shaft. Such mechanism comprises a spiral cam 25 on the fan shaft 24, and a co-operating arm 26, which is attached to shaft 28 and is disposed in front of the fan. A roller 27 bears against the face of the cam and facilitates movement of the arm when the fan is rotated. The shaft 28 may be journaled in bearings 29 on the frame, and may carry an arm 30 which is connected by a pin and slot connection to the bar 15.

Under the gravity system, the counter-weight 35 is sufficiently heavy to hold the dampers open, and to force the roller 27 along the cam shaft to the position shown in full lines in Fig. 3. When the fan is started, the initial turning movement of the fan shaft throws the arm 26 outwardly from the broken line position 26^a to the full line position and moves the dampers from the broken line position 12^a in Fig. 4 to the full line position. The dampers are maintained closed so long as the fan is in operation. When the fan is stopped the counter-weight 35 forces the roller along the spiral cam, and thereby automatically opens the dampers. In this way, operation of the dampers is not dependent upon pneumatic pressure, nor is it dependent upon the maintenance of electrical connections between the motor circuit and the damper. The initial turning movement of the fan shaft is sufficiently slow to produce a satisfactory damper closing movement, and the pitch of the cam is sufficiently large to permit the roller on the arm 26 to traverse the cam in an expeditious manner.

I claim:

1. In combination, an air conduit having an opening therein, a motor driven fan occupying part of the opening, a movable closure adapted to occupy another part of the opening, and means connected with the closure mechanism and coacting with and movable axially along the motor shaft for closing the closure during substantially the first revolution of the fan.

2. In combination, an air conduit having an opening therein, a motor driven fan occupying part of the opening and a movable closure adapted to occupy another part of

the opening, a cam associated with the motor shaft, and means connected with the closure mechanism and engaged by the cam for closing the closure when the fan is started.

3. In combination, a heating chamber of a hot air furnace having an inlet conduit therefor, a motor driven fan for forcing air through the conduit, a movable closure associated with the conduit, and means operated by the motor during substantially the first turn of the motor shaft, for moving the closure to closed position when the fan is started.

4. In combination, a heating chamber of a hot air furnace having an inlet conduit therefor, a motor driven fan for forcing air through the conduit, a movable closure associated with the conduit, and means operated by the motor during substantially the first turn of the motor shaft for moving the closure to closed position when the fan is started, and other means operating to open the closure when the fan is stopped.

5. In combination, an air conduit having a fan opening, and a damper opening, a motor driven fan associated with the first mentioned opening, a damper associated with the second named opening, a pivoted member disposed alongside the fan, a worm mounted on the motor shaft for actuating the member, and means connecting the member with the damper for actuating the damper, whenever the member is operated. In testimony whereof, I hereunto affix my signature.

ALBERT R. TEARE.