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C. L. KOON
HOT AIR CIRCULATOR
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FIG. 1

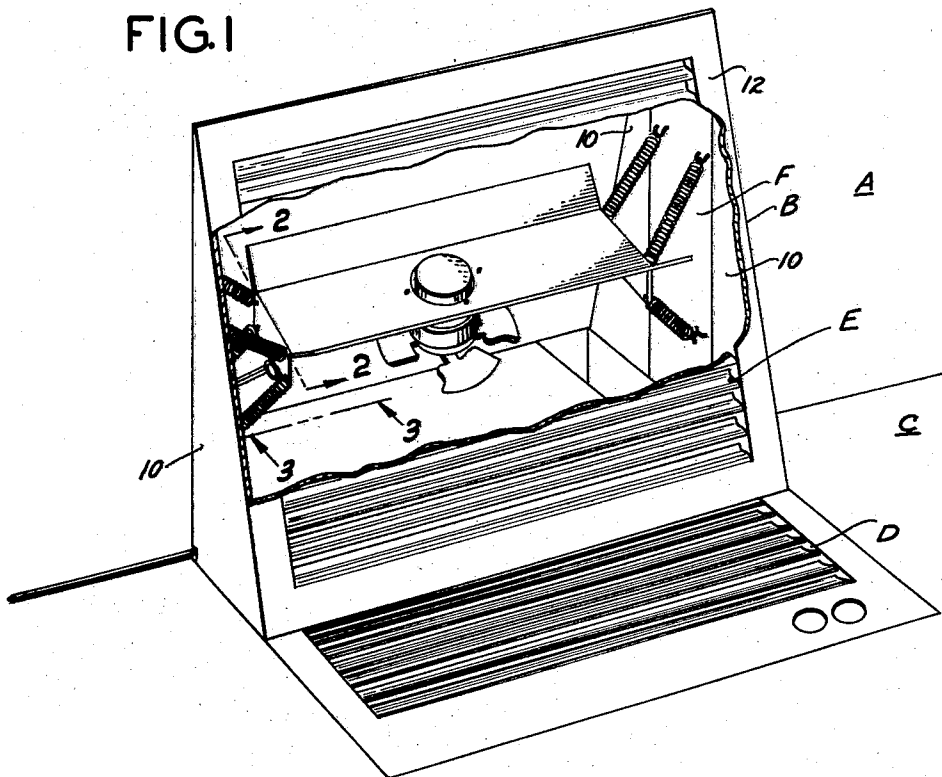


FIG. 2

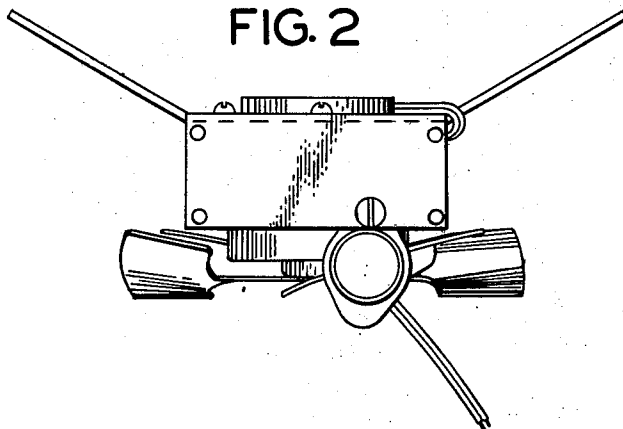
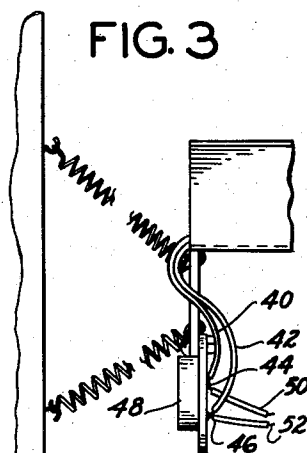


FIG. 3



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1

3,148,613

HOT AIR CIRCULATOR

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The present invention relates generally to the field of air circulating devices, and more particularly to a motor-driven hot air circulator that can be removably mounted above a floor furnace in a home, and when actuated circulates warm air throughout a room or rooms, rather than permitting the heated air to rise adjacent the ceiling as normally occurs with such floor furnaces.

In many of the older homes, particularly in milder climates, it is commonplace to find that they are heated by floor furnaces. A floor furnace has a register associated therewith which is usually included as a part of a wall structure. This register is capable of discharging heated air into either a room on one side of the wall structure, or into two rooms that are separated by the wall in which the register is mounted. Such furnaces are relatively inexpensive to install, require no ducting, and as a result have been used extensively in the heating of homes in the milder climates found in the southern, southwestern and the Pacific coastal areas.

However, the heated air from floor furnaces of the type described is not uniformly distributed throughout a room. Due to the lighter density thereof, the heated air from a floor furnace rises to a position adjacent the ceiling, and as this air cools it moves downward as it is replaced by warmer. Thus, while in theory at least, a certain circulation of warm or heated air is obtained, the air of maximum temperature is located adjacent the ceiling of the room where it provides little or no beneficial effect with regard to the comfort of the occupants of the room or rooms heated by the floor furnace.

The use of blowers or other mechanical devices as a means to circulate heated air is by no means new, for such devices are commonly included as a part of modern present-day furnaces. However, prior to the present invention no means had been devised whereby a blower or other mechanical air circulator could be incorporated into an already existing floor furnace or included as a part thereof when a new floor furnace was being installed.

A primary object of the present invention is to provide an air circulator that is power driven and can be removably mounted in the upwardly extending register portion of a floor heater, with the assurance when the circulator is so installed that an outwardly directed stream of heated air will effect a forced circulation of the heated air with the cool air in a room.

Another object of the invention is to provide an air circulator that is particularly adapted to be installed in an upwardly extending register formed in a wall structure, which register is in communication with a floor furnace situated therebelow.

A still further object of the invention is to provide an air circulator having a thermostat associated therewith which automatically breaks the electrical circuit to the actuating motor of the circulator when the temperature of the ambient atmosphere is below a predetermined point.

Yet another object of the invention is to supply an air circulator of relatively simple mechanical structure which requires a minimum of maintenance attention, can be easily and quickly installed in conjunction with an existing floor furnace register system by one having little or no mechanical ability, is quiet in operation, and cannot impart vibration to the register system.

A further object of the invention is to provide a device that can be fabricated from standard, commercially

2

available materials, requires no extensive plant facilities for its production, and as a result can be retailed at a sufficiently low price as to encourage its widespread use.

Yet still another object of the invention is to supply an air circulator that can be removably mounted in an operating position relative to a floor furnace.

These and other objects and advantages of the invention will become apparent from the following description of a preferred form thereof, and from the accompanying drawing illustrating that form, in which:

FIGURE 1 is a perspective view of an upwardly extending register formed in a wall structure, with a portion of the register cut away to show the air circulator shown removably disposed therein, and the register shown as being in communication with a floor furnace situated below a horizontal grating extending outwardly from the register;

FIGURE 2 is a fragmentary enlarged end elevational view of the circulator taken on line 2-2 of FIGURE 1; and

FIGURE 3 is a fragmentary side elevational view of the circulator taken on line 3-3 of FIGURE 1.

With further reference to the drawing for the general arrangement of the invention, it will be seen that a portion of a vertical wall A has been cut out in which a register B is disposed that is in communication with a furnace (not shown) situated below the floor C. A horizontal grill D extends outwardly from the register B across an opening in floor C to permit access to the furnace (not shown).

Register B includes an angularly disposed, louvred grill E, through which warmed or heated air from the furnace rises upwardly into the room to be heated by the furnace. Normally, there are two registers B, one situated on each side of the wall A, with each including a grill E through which heated air passes upwardly. The circulator of the present invention is adapted to operate equally satisfactorily, irrespective of whether one or two registers B are provided.

Each register B includes two spaced, triangular end sections 10 that are disposed normal relative to the wall A, the forward edges of which extend downwardly and outwardly from the wall. The outer edges 10 develop into a downwardly and outwardly tapering frame 12 that extends around the grill E and supports the same in a fixed position relative to the wall A. The register shown in FIGURE 1 is of a type that includes outlets for the heated air to pass into rooms on both sides of the wall A, and may include two identical rectangular, upwardly extending end pieces F, but one of which is shown in FIGURE 1, that are continuations of the end sections 10. In other installations it may be found that the end pieces F are actually integral parts of the wall structure A. However, irrespective of whether the end pieces F are integrally formed with end sections 10 or are a part of the wall structure, the present invention may be installed with equal ease in conjunction with a floor furnace.

The hot air circulator (FIGURE 1) includes a rigid rectangular plate 14, preferably fabricated from a material such as steel, or the like. The longitudinal edges of plate 14 develop into two upwardly and outwardly extending deflectors 16. Plate 14 has two end pieces 18 that extend downwardly therefrom that are in substantially parallel relationship. As clearly shown in FIGURE 1, plate 14 is substantially shorter in length than the distance between the two rectangular end pieces F. Each end piece 18 has four openings 20 formed therein adjacent the corners thereof. Each of these openings engages a first hook portion 22 of a coiled helical spring 24. Four hooks 26 are mounted on each of the end pieces F and are vertically spaced from one another a greater distance than between openings 20. The springs 24 are suf-

ficiently long that when second hook portions 28 thereof are caused to removably engage the hooks 26, the springs 24 are placed under tension to resiliently support the plate 14 within the confines of the opening 30 in the wall A with which the register B is associated.

An electrical motor 32 is provided, at least a portion of which depends below the plate 14. Motor 32 is affixed to the plate 14 by conventional means such as screws 34, or the like. Motor 32 includes a drive shaft 36 on which a number of circumferentially spaced blades 38 are mounted. These blades are tilted in a reversed direction so that as the motor rotates in a clockwise direction, as shown in FIGURE 1, the blades will tend to blow a stream of air upwardly against the deflectors 16 rather than downwardly towards the floor C. The motor 32 is normally of a type which operates from a domestic source of electrical energy. Two insulated electrical conductors 40 and 42 lead from the motor 32. Conductor 42 is connected to the electrical supply (not shown), and conductor 40 is connected to a terminal 44 of a thermostat 48 that is mounted on end piece 18. A second terminal 46 of thermostat 48 is connected by an insulated electrical conductor 52 to a domestic source of electrical energy (not shown).

To prevent operation of the circulator at a time when it would serve no useful purpose, the thermostat 48 is of a type which completes an electrical circuit to energize the motor 32 only when the temperature of the ambient atmosphere surrounding the thermostat has risen to a predetermined point, say 125° F. When this temperature is reached, the air rising from the floor furnace is sufficiently hot as to impart some heat into the rooms adjacent the wall A when forcibly discharged therein by means of the circulator of the present invention. When the temperature of the air surrounding the thermostat 48 falls below a predetermined temperature, say 120° F., the air has little or no heating capability and no useful purpose would be achieved by operation of the circulator. Accordingly, when the temperature of the ambient atmosphere falls below this minimum temperature, the thermostat 48 assumes an open position whereby the circuit to the domestic source of electrical energy is broken, and operation of the motor 32 ceases.

As will be apparent from FIGURES 1 and 3, when the motor 32 operates, warmed air is drawn upwardly from the floor furnace (not shown), and directed against the deflectors 16 to be discharged outwardly through the louvered sections E into the confines of the room, to forcibly mix with the cool air therein, with the whole mass of air being circulated to warm the occupants (not shown) of the room. Operation of the circulator in the manner just described not only makes a room or rooms adjacent the wall A more comfortable to occupy, but provides a much more economical operation of the floor furnace, for the heated air generated thereby is mixed with cool air existing in the lower portion of the room whereby it is also heated rather than the hot air rising from the furnace to a position adjacent the ceiling where a minimum of heat is imparted to the room as a whole.

The operation of the present invention has been described in detail and need not again be repeated.

Although the present invention is fully capable of achieving the objects and providing the advantages hereinbefore mentioned it is to be understood that it is merely

illustrative of the presently preferred embodiments thereof and I do not mean to be limited to the details of construction herein shown and described, other than as defined in the appended claims.

I claim:

1. A hot air circulator for use with a floor furnace situated below a vertically extending opening formed in the lower portion of a wall separating two rooms, including:

- (a) an elongate rigid plate adapted to be disposed in a horizontal position within the confines of said opening;
 - (b) a motor supported from said plate;
 - (c) a plurality of circumferentially spaced blades positioned below said plate and rotated by said motor, which blades have a reverse pitch, and during rotation draw a stream of air upwardly in said opening;
 - (d) deflector means extending upwardly and outwardly from the longitudinal edges of said plate for dividing said stream of air and directing substantially equal quantities thereof outwardly and upwardly through said opening into said rooms on opposite sides of said wall;
 - (e) springs means for removably supporting said plate in said horizontal position, which means minimizes the transmission of vibration from said motor and plate to said wall;
 - (f) an electrical circuit for supplying electrical energy to said motor; and
 - (g) a thermostat forming a part of said circuit and disposed adjacent said plate, which thermostat is normally in an open position, but which closes to complete said circuit to energize said motor when the temperature of the ambient atmosphere is sufficiently high to impart appreciable heat when it is discharged as said stream of air into said rooms.
2. A hot air circulator as defined in claim 1 which further includes two end pieces that are disposed in a direction substantially normal relative to said plate and are connected thereto, with first ends of said spring means which comprise a plurality of helical springs being connected to said end pieces; and means for holding second ends of said springs in fixed position adjacent upwardly extending side surfaces of said opening, which springs when so held support the weight of said circulator and due to the resiliency thereof said springs transmit a minimum of vibration to said wall from said motor during rotation thereof.
3. A hot air circulator as defined in claim 1 wherein said deflector means comprise two rigid elongate members that extend upwardly and outwardly from opposite longitudinal sides of said plate at an angle of less than 90° relative to the horizontal.

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