March 16, 1965 O. F. MAYCEN 3,173,478

AIR DISTRIBUTING UNIT

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FIG. 1

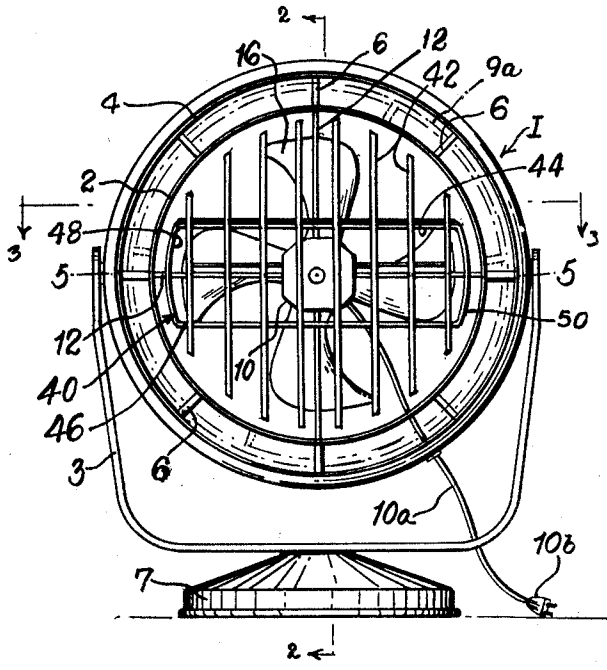


FIG. 2

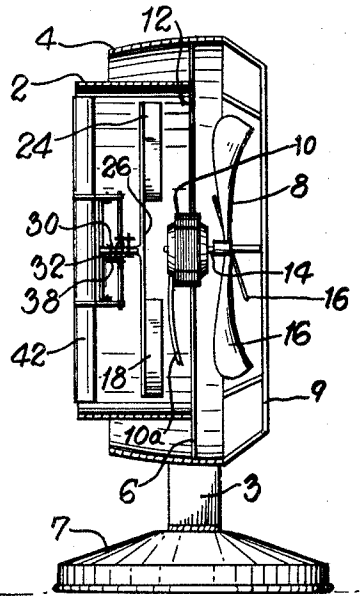


FIG. 3

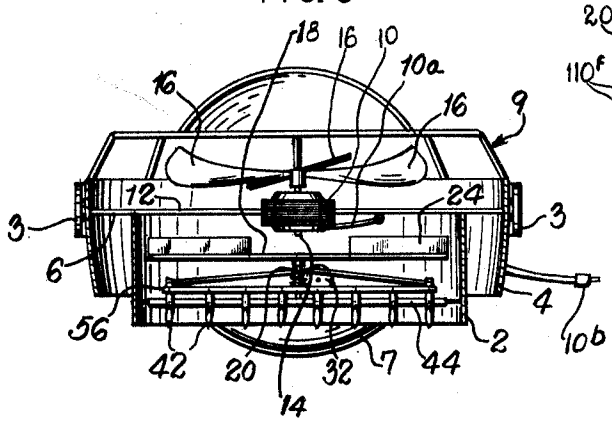
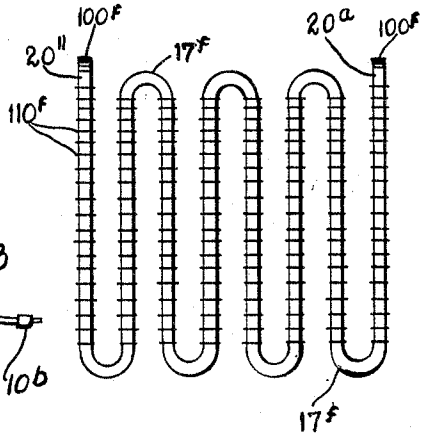


FIG. 15.



INVENTOR.
OTHMAR F. MAYCEN
BY
Zoltan Polacheck
ATTORNEY

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FIG. 4

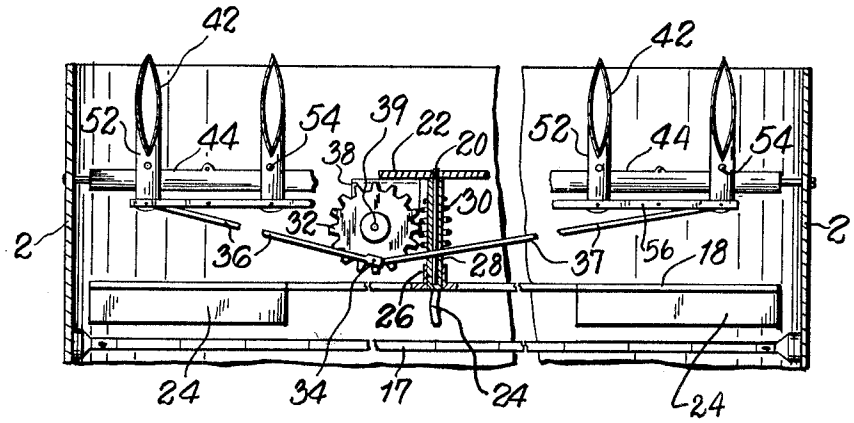
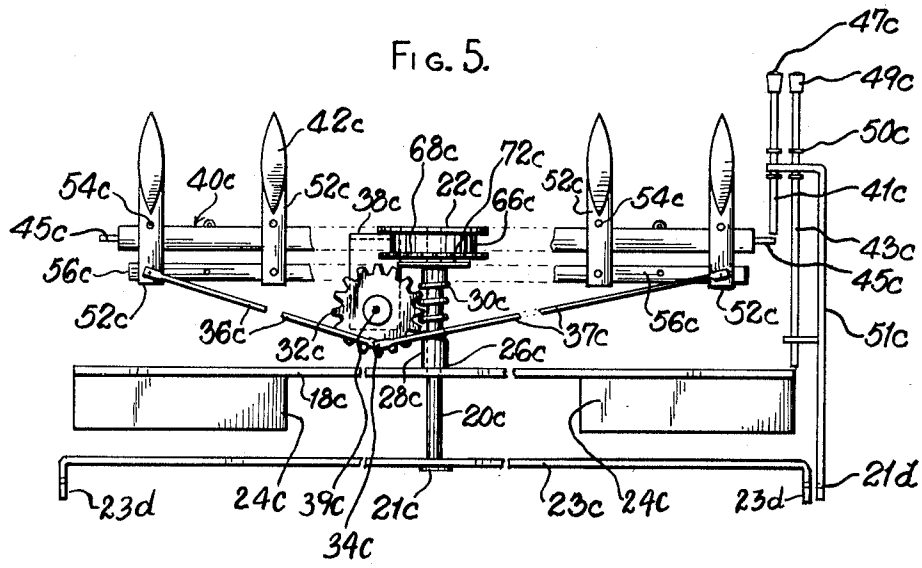


FIG. 5.



INVENTOR.
OTHMAR F MAYCEN
BY
Holcombe
ATTORNEY

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FIG. 6.

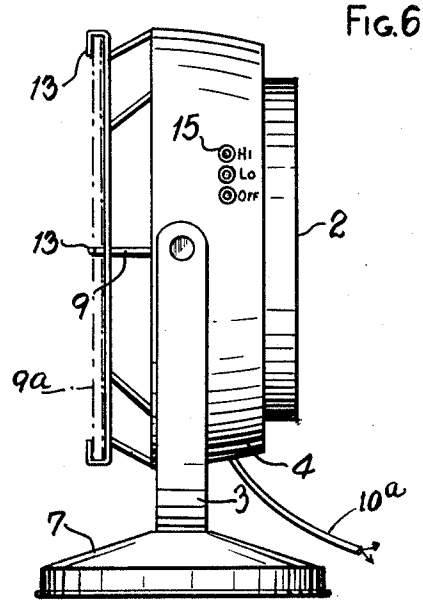


FIG. 7.

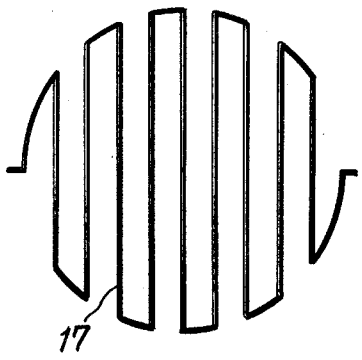
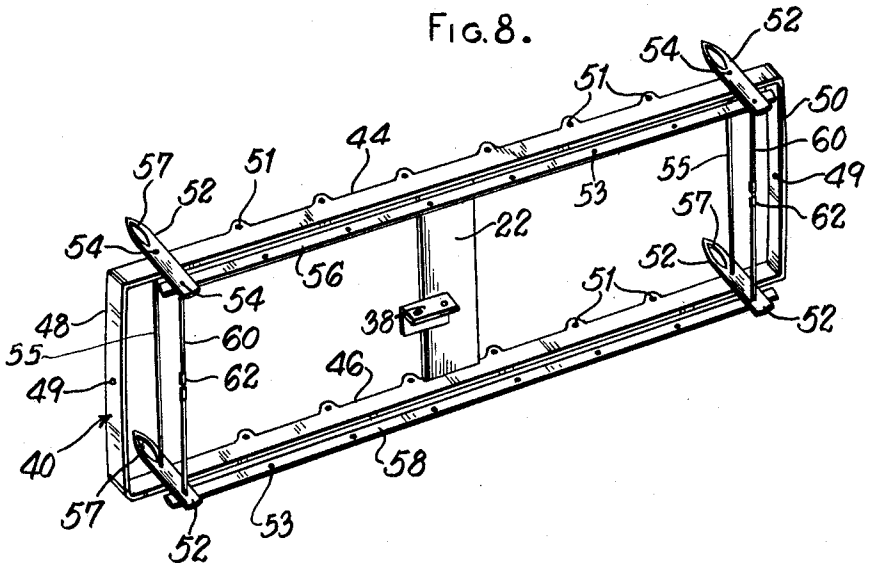


FIG. 8.



INVENTOR.
OTHMAR F. MAYCEN
BY
ATTORNEY

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FIG. 13.

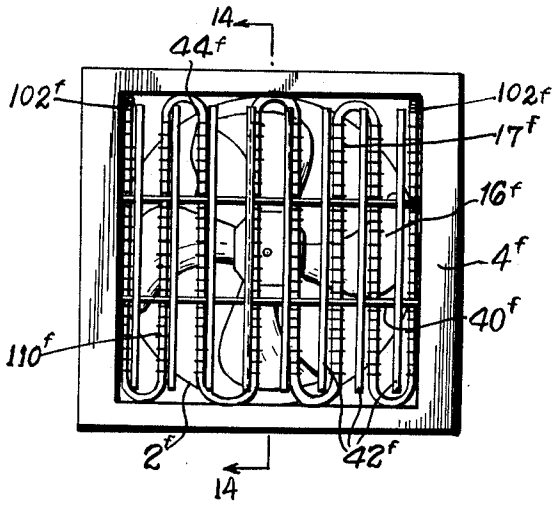


FIG. 14.

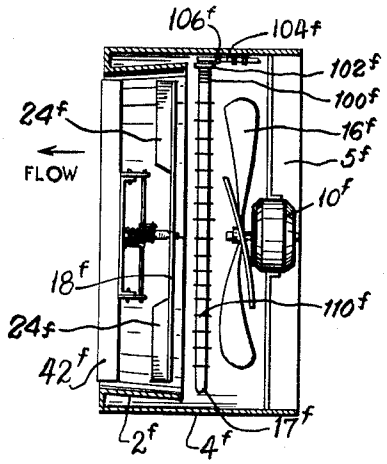


FIG. 12.

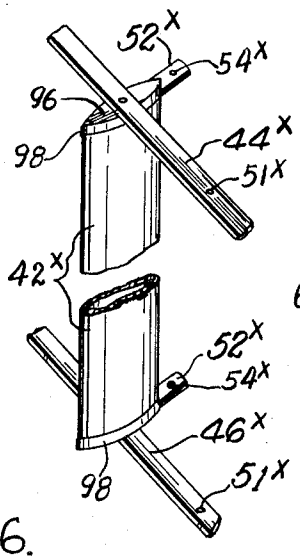


FIG. 11.

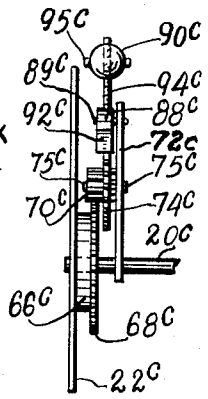


FIG. 10.

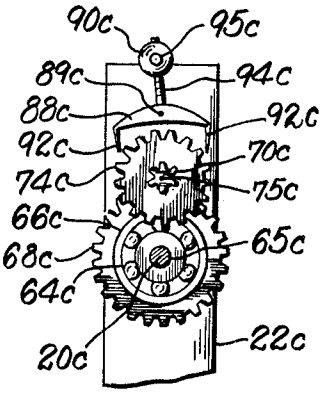


FIG. 16.

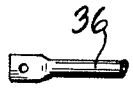
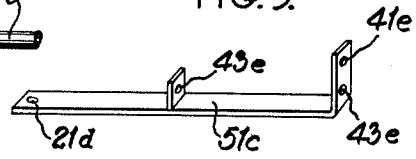


FIG. 9.



INVENTOR.
OTHMAR F. MAYCEN
BY
Roston Holcomb
ATTORNEY

United States Patent Office 3,173,478 Patented Mar. 16, 1965

3,173,478

AIR DISTRIBUTING UNIT

Othmar F. Maycen, New York, N.Y.
(Gurkgasse 16, Vienna 14, Austria)

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12 Claims. (Cl. 165—121)

The present invention relates to improved fans and more particularly to an air distributing unit adapted for heating a room and cooling a room or the like.

One object of the invention is to provide an improved air distributing unit including a rotor having elongated blades on the hub of the rotor and said blades being arranged in a plane containing the shaft of the rotor, the function of which results in increased operational efficiency of the unit.

Another object is to provide an air distributing unit of the character indicated having streamline shaped air deflector blades preferably of elliptical cross-sectional shape, to minimize air flow velocity retardation which contributes to the operating efficiency of the unit.

Another object of the invention is to provide a device for distributing air which is of simple and reliable construction and capable of oscillating the air, rotating the oscillating air and which is adaptable for distributing conditioned air such as heated air as well as cooled air.

Another object is to provide a device of the character indicated having a rotor and a motor driven fan coaxially disposed in a suitable housing, the blades of the rotor being positioned relatively straight with respect to the shaft of the rotor for rotating the rotor by the air stream and thereby maintaining unobstructed flow of the air stream.

Another object is to provide a device of the foregoing character wherein the support frame supporting the air deflector blades is arranged for rotation about its central axis, and to provide for this purpose a speed control mechanism to maintain constant speed of rotation of the support frame.

Other objects of the invention are to provide means for distributing conditioned air; to provide suitable housing and means for attaching an air filter to the housing and to obtain other objects and advantages of the invention which will appear from the following description and drawings.

In the drawings:

FIG. 1 is a front elevational view of a portable air distributing device embodying the principles of the invention;

FIG. 2 is a side sectional view of the air distributing device shown in FIG. 1;

FIG. 3 is a sectional plan view taken on lines 3—3 of FIG. 1;

FIG. 4 is an enlarged view partly in section and partly in plan, illustrating the manner in which the rotor is connected with component members, parts being broken away;

FIG. 5 is an enlarged view similar to FIG. 4 illustrating the manner in which the support frame supporting the air deflector blades is arranged for rotation, parts being omitted;

FIG. 6 is a side elevational view similar to FIG. 2 indicating an air filter in dot-dash lines;

FIG. 7 is a front elevational view of a heating element;

FIG. 8 is an enlarged perspective view of a support frame for supporting the air deflector blades and component members;

FIG. 9 is a perspective view of a bracket;

FIG. 10 is a front view of a speed control mechanism;

FIG. 11 is a side view thereof, parts being added;

FIG. 12 is a fragmentary perspective view of a modified form of mounting the air deflector blades;

FIG. 13 is a front view of an air distributing unit showing a modified form of construction;

FIG. 14 is a vertical sectional view taken on lines 14—14 of FIG. 13;

FIG. 15 is a front view of a tubular member and

FIG. 16 is an enlarged fractional view of a link member.

Referring to the drawings in detail and particularly to FIGS. 1 to 4, the air distributing device indicated by numeral 1 comprises preferably a cylindrical air duct housing 2 mounted centrally in a housing 4 by suitable supports 6. The housing 4 may be supported between the arms of a U-shaped bracket 3 to pivot about a horizontal axis at 5 and said bracket may be secured on a base 7 whereby the housing can be rotated and inclined in various directions. A fan 8 driven by a motor 10 is mounted in the housing 4 by suitable supports 12 with the motor shaft 14 and fan blades 16 rearward of the housing and in contact with open air. The motor 10 is connectable with a source of electric current by a two-wire cord 10*a* and plug 10*b* and may be turned on and off by a push button switch. A rotor 18 disposed coaxially with the fan 8 is rotatable on shaft 20 which is secured on a support member 22, the rotor has a plurality of elongated blades 24 preferably of rectangular shape, a sleeve 28 secured on the hub 26 of the rotor, has a worm 30 formed of a wire coil which is simple and durable. This worm 30 is in mesh with gear 32 having an eccentric axle pin at 34, the gear 32 is journalled on axle 39 which is supported by a bracket 38 of the support member 22. Operatively connected with the axle pin 34 are a pair of link members 36 and 37 to transmit motion to the cooperating component members, as will be subsequently described.

FIG. 8 shows a frame member 40 to support the air deflector blades. The frame is composed of upper longitudinal member 44 and lower longitudinal member 46 spaced by the central member 22 and a pair end members 48 and 50. The frame 40 is adapted for mounting on the front portion of the air duct 2 or any housing and may be fastened thereto by screws through the members 48 and 50 at 49. The members 44 and 46 have a plurality of pairs of vertically aligned apertures 51 to register with corresponding apertures 54 in upper and lower brackets 52 pivoted with the members by pins 55 or other suitable means. Upper and lower longitudinal guide members 56 and 58 pivotally mounted on the upper and lower brackets 52 serve to operatively connect the brackets for oscillatory motion in unison and each bracket has an opening 57 to receive an air deflector blade 42. Each upper and lower bracket 52 adjacent the end members 48 and 50 has a rod member 60 connected with the members 56 and 58 and each rod 60 has a pair of sleeves 62 between which the link members 36 and 37 pivot, thus oscillating motion is transmitted to the air deflector blades.

The portable fan device described in connection with FIGS. 1 to 4 is adapted to distribute and activate the air in a room. The fan draws air through the inlet and outlet opening of the housing, the fan may have four blades 16 driven simultaneously by the motor 10, and the rotor 18 for reason of efficiency may also have four blades, however the rotor operates quite efficient with two blades and the power of the rotor is attributed to the operational alignment with the fan, the construction of the rotor blades 24 and the angular position of the rotor blades. The power of the rotor is still more pronounced when the blades of the rotor are curved or concave shaped as indicated at 24 (FIG. 4). The rotor 18 is rotated by the full diametrical air stream but when the rotor is not in near contact with the air slip stream of the fan, the blades of the rotor may be adjusted to maintain the operating efficiency of the air distributing device. The device can be used not only for distributing and activating the air in a room but also for heating the air while continuing to be distributed. To effect such heating, a heating coil 17

may be mounted in the path of air flow and connected in circuit with the motor and switch by a two-wire cord 10*a*. If desired, the air will be cleaned when a filter is attached on the air inlet opening of the housing. A simple arrangement is shown in FIG. 6, wherein the filter 9*a* indicated in dot-dash lines is attached in the slide brackets 13 of the housing 4, the air filter is of conventional construction.

FIGS. 13 and 14 show the air distributing device in a modified form. The housing 4*f* is substantially square shaped to receive a tubular member 17*f*. The housing may have an air duct 2*f* joined integrally with the housing, but the construction of the component members for oscillating the air is substantially like that previously described except that the air deflector blades 42*f* are of uniform length. The motor 10*f* with the fan 16*f* is mounted in the housing 4*f* on suitable supports, the rotor 18*f* being disposed coaxially with the fan 16*f* and the air deflector blades 42*f* are pivotally mounted in the forward portion of the housing. A suitable air filter may be secured attached on the air inlet portion of the housing at 5*f*. The air filter and the electrical connection of the motor are not shown in that they are conventional.

The member 17*f* is formed of a plurality of bent tubes and each tube has a series of fins 110*f* serving to disperse the temperature from the surface of the tubes. The inlet and outlet ends 100*f* of the tubes (FIG. 15) being screw threaded for connection to a joint 102*f* at one end of the inlet pipe 104*f*. The inlet and outlet pipes of the tubular member 17*f* are secured preferably on the upper portion of the housing by strap means 106*f* or any other suitable means for mounting. The tubular member may be connected for example, with a source of steam, the steam will flow through the tubular member and impart heat thereto while the steam will issue at the other end 100*f*, which is connectable with the source of steam. Likewise when the tubular member is connected with a source of refrigeration the refrigerant will flow through the tubular member, evaporating therein and cool the tubular member while the refrigerant will issue at the other end 100*f* which is connectable with the source of refrigeration by conventional means.

In air conditioning units of prior art, the conditioned air is discharged usually in one direction by stationary discharge blades, rotatable louver grilles or the like which are stationary but adjustable each time a change of direction of air flow is desired. However, with the construction shown by the present invention the air discharge blades are arranged to pivot so as to oscillate the full diametrical air stream and thereby distributing the air in all directions with maximum efficiency. It will be seen that the air discharged by the unit will flow into a room in a way so that it is changing directions as it is discharged whereby the air is thoroughly distributed in the room. Obviously, when a large room or the like is economically heated, several of the units (FIGS. 13 and 14) will be installed in the room and connected with a suitable source of steam. Likewise when a large room is to be cooled more economically, several of the units installed in the room will be connected with a source of cooling such as a mechanical refrigeration system.

The area of distribution will be further increased when the support frame supporting the air deflector blades is rotated about its center axis. In this form (FIG. 5) the component parts are indicated by similar numerals. The rotor 18*c* is mounted on shaft 20*c* which is secured on bracket 23*c* the ends of the bracket forming apertured flanges 23*d* for mounting on the interior portion of a housing. Sleeve 28*c* fixed to the hub of the rotor has a worm 30*c* for rotating gear 32*c* said gear has a pin 34*c* eccentric of the gear center axle 39*c*. A pair of link members 36*c* and 37*c* being connected with the pin 34*c* and the opposite ends of said link members being connected with the longitudinal member 56*c* for transmitting oscillatory motion to the brackets 52*c* which carry the deflector blades 42*c*. The gear 32*c* journalled on axle 39*c* is supported by a bracket 38*c* on the support member 22*c* of the frame 40*c*. The brackets 52*c* pivot on the longitudinal members of the frame at pivot points 54*c* for alternately changing the angular position of the deflector blades 42*c* upon rotation of the rotor 18*c*, while the frame 40*c* supporting the air deflector blades is rotatable about shaft 20*c* by and with the air stream. The frame is supported for rotary stability by a ball bearing 64*c* with its internal hub 65*c* fixed on shaft 20*c* coaxial of the rotor 18*c*. The external ring 66*c* is secured on the member 22*c* and the ball bearing has a gear ring secured on the external ring 66*c* hereafter explained.

The speed of the rotating support frame will increase due to the acceleration of velocity. Inasmuch as a constant speed of 10 to 15 revolutions is recommended, a speed control mechanism is shown in FIGS. 10 and 11. The gear 70*c* cooperates with the aforementioned gear ring 68*c* and is coaxially secured on the companion gear 74*c* and journalled on a bracket 72*c*. Both gears being rotatable on axle 75*c* fixed on the bracket 72*c* which is stationary and secured on shaft 20*c*. The bracket 72*c* is omitted in FIG. 10 for clarity. A selector 88*c* pivotally secured on the bracket 72*c* to pivot on axle 89*c* serves to engage its oppositely spaced fingers 92*c* alternately with each tooth of the gear 74*c*, and the selector has a counter weight 90*c* attached to a central post 94*c* which by the action of its position tends to retard the rocking motion of the selector. The weight 90*c* is adjustable on the post 94*c* by screws 95*c* for controlling the speed of motion of the selector 88*c* which influences the speed of rotation of the support frame 40*c*.

As shown in FIGS. 5 and 9, means are provided for arresting rotation of the rotor and thereby controlling directional flow of the air. Such simple means include a bracket 51*c* which may be secured on the bracket 23*c* at 23*d*, the bracket 51*c* has flanges which have apertures 41*e* and 43*e* to receive a pair of rod members 41*c* and 43*c*. Rod 43*c* is adapted when operated by the knob 49*c* to engage the rotor 18*c* to arrest rotation of the rotor, when the rod 43*c* is moved out of engagement the rotor will be free to rotate but when said rod is in engagement with said rotor the rotation of said rotor is arrested at any desired angular position of the air deflector blades 42*c*. Likewise when the rod 41*c* is operated by the knob 47*c* to engage abutment 45*c* of the support frame 40*c* to arrest its rotation and with the rod 41*c* moved out of engagement with abutment 45*c* the support frame will be free to rotate.

It will be understood that various changes and modifications may be made from the foregoing without departing from the spirit and scope of the appended claims.

What is claimed is as follows:

1. Air distributing device, comprising in combination, a motor driven fan, a rotor disposed coaxially with respect to and in front of said fan, said rotor having elongated blades positioned in a plane containing the shaft of said rotor to rotate said rotor when impinged by the air stream from the blades of said fan, a plurality of elongated air deflector blades, means supporting said air deflector blades in spaced parallel relation and centrally of said rotor, means pivotally mounting each of said air deflector blades in said supporting means about their individual longitudinal axes, means controlled by the rotation of said rotor to simultaneously oscillate the pivotal positions of said air deflector blades in unison by and with the air stream from said fan, and power operated means to actuate said fan.

2. A device as defined in claim 1, including a first housing, a second housing of smaller diameter disposed coaxially within said first housing, the said motor driven fan being coaxially disposed within said first housing and having a plurality of fan blades with the main periphery of said blades arranged adjacent to but extending outside and clear of the rear ends of said housings, to permit

unobstructed air to be drawn through said second housing, a fan guard on side first housing, and supporting means to support the above structure.

3. A device as defined in claim 1, wherein the blades of said rotor are curved crosswise of said blades.

4. Air distributing device, comprising in combination, a housing containing an air duct and a motor driven fan, a rotor disposed in said air duct, said rotor being disposed coaxially with said fan and having at least a pair of elongated blades positioned in a plane containing the shaft of said rotor, for revolving said rotor by the air stream from the blades of said fan, a plurality of spaced air deflector blades, means supporting said air deflector blades in parallel relation in front of said rotor, means pivotally mounting each of said air deflector blades in said supporting means about their individual longitudinal axes, and means actuated by the rotation of said rotor to simultaneously oscillate the pivotal positions of said air deflector blades in unison.

5. A device as defined in claim 4, wherein said air deflector blades are hollow and uniform in length.

6. A device as defined in claim 4, wherein said air deflector blade mounting means comprises a supporting frame having side portions and upper and lower longitudinal members in spaced relation, a plurality of pairs of upper and lower elongated brackets pivoted in spaced relation along said upper and lower longitudinal members of said frame, each of said pairs of brackets having at one end a pair of aligned openings for receiving one of said air deflector blades, and parallel guide and actuating mechanism interconnecting the other end of said bracket for pivotal motion of the brackets in unison.

7. A device as defined in claim 4, wherein the rotor actuated means for oscillating said air deflector blades includes a helical coil worm secured to the hub of said rotor, a gear supported in said air duct in mesh with said worm and rotatably journalled with respect to said supporting frame, an eccentric axle pin on said gear, and

link means interconnecting said axle pin and said guide and actuating mechanism.

8. A device as defined in claim 4, wherein said deflector blades are of streamline shape in cross section, to minimize air flow velocity retardation.

9. A device of the character described, comprising in combination, a housing containing a rotor and a motor driven fan, said rotor disposed coaxially in front of said fan and having a plurality of elongated blades positioned in a plane containing the shaft of said rotor, for rotating said rotor by the air stream from the blades of said fan, a support frame coaxially disposed in front of said rotor, a plurality of elongated air deflector blades pivotally mounted on said support frame, means interconnected between said rotor and said air deflector blades for alternately changing the angular and pivotal positions of said air deflector blades in unison, upon rotation of said rotor, and means for controlling directional flow of the issuing air stream.

10. A device as defined in claim 9, including a heating element disposed in the path of air flow from said fan.

11. A device as defined in claim 9, wherein the blades of said rotor are curved transversely of said blades.

12. A device as defined in claim 9, wherein said means for controlling directional flow of air, includes a bracket disposed laterally of said support frame, a rod slidably arranged on said bracket, said rod being manually movable and serving to stop rotation of said rotor at any angular position of said air deflector blades.

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