

Feb. 12, 1935.

W. A. SPEAR

1,990,801

AIR DISTRIBUTOR FOR ELECTRIC FANS

Filed May 31, 1934

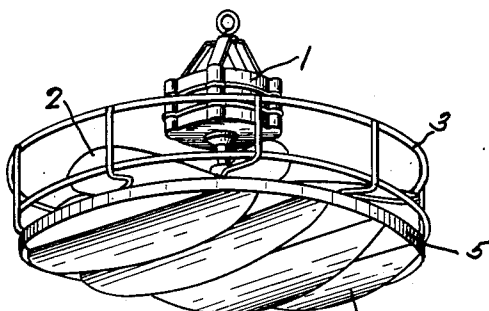


Fig. 1

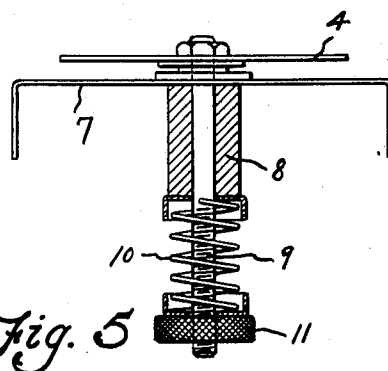


Fig. 5

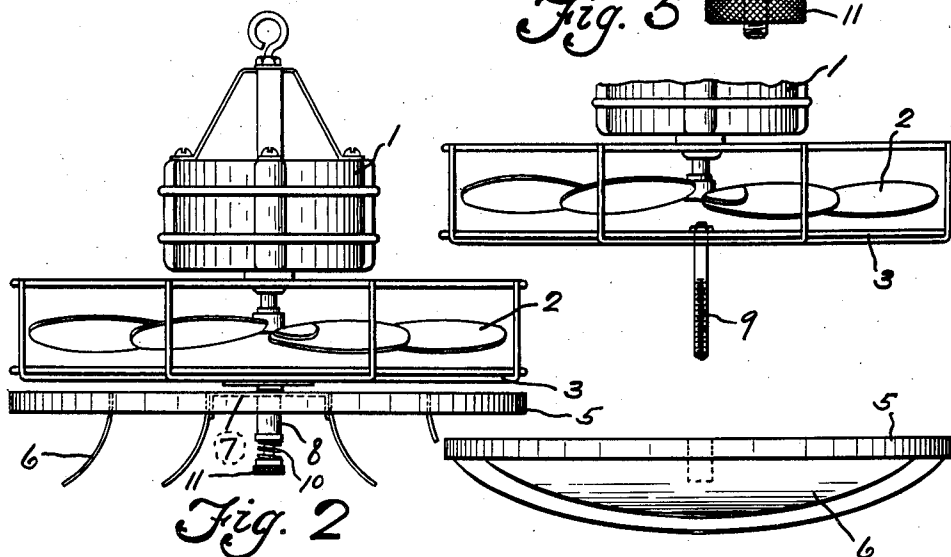


Fig. 2

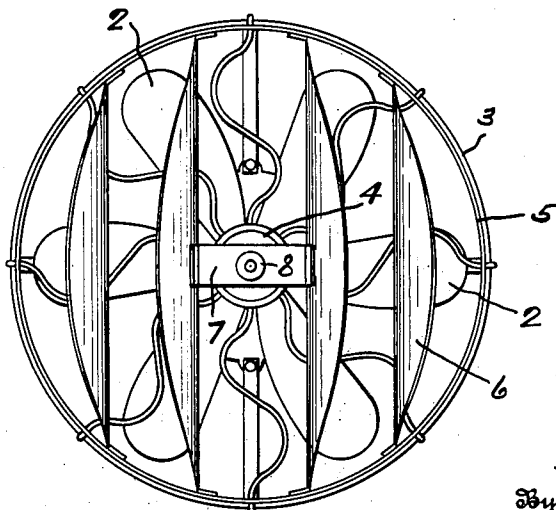


Fig. 3

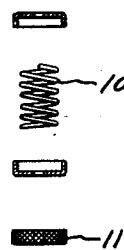


Fig. 4

Inventor
Walter A. Spear
By Walker and Dylberg
Attorneys

UNITED STATES PATENT OFFICE

1,990,801

AIR DISTRIBUTOR FOR ELECTRIC FANS

Walter A. Spear, Cincinnati, Ohio, assignor to
Victor Electric Products, Inc., Cincinnati, Ohio,
a corporation of Ohio

Application May 31, 1934, Serial No. 728,224

10 Claims. (Cl. 230—274)

This invention relates to ventilating fans and more particularly to the provision of a rotary distributor for subduing the direct air blast effect and spreading the air current over a relatively wide field of operation.

It is recognized that heretofore various forms of deflectors have been employed in association with electric fans which are mounted stationarily relative thereto and also rotary deflectors which have been positively driven by gear or belt connections with the fan motor.

In the present instance the deflector or distributing unit is mounted for rotation wholly independently of the fan parts, and is driven solely by the vortical influence of the air discharged from the fan. Air currents from a rotary fan do not move in straight lines but possess a helical motion, advantage of which is taken in the present instance to thereby drive an independently rotatable symmetrical distributor unit.

The object of the invention is to simplify the structure as well as the means and mode of operation of air spreading and distributing means for rotary fans, whereby such devices may not only be economically manufactured, but will be more efficient in use, uniform in action, automatic in operation, of few parts and unlikely to get out of repair.

A further object of the invention is to enable the use of rotary fans without establishing objectionable drafts or air blasts and effect distribution of the air currents over a relatively large area.

A further object of the invention is to provide an air distributing and deflector device which is applicable to electric fans of conventional type.

A further object of the invention is to provide a rotary air distributor operative solely by the influence of the moving air currents without imposing a driving load upon the fan motor.

A further object of the invention is to provide governing means enabling the distributor unit to be operated at different rates of rotation and differentially relative to the fan rotation.

A further object of the invention is to provide an air distributor which may be mounted directly upon the conventional fan guard for free rotation.

A further object of the invention is to obviate disturbance of papers and light objects by the air currents while retaining the cooling effect of air circulation.

With the above primary and other incidental objects in view, as will more fully appear in the

specification, the invention consists of the features of construction, the parts and combinations thereof, and the mode of operation, or their equivalents, as hereinafter described and set forth in the claims.

In the drawing wherein is shown the preferred, but obviously not necessarily the only form of embodiment of the invention, Fig. 1 is a perspective view of a ceiling fan with which the present rotary distributor has been assembled. Fig. 2 is a side elevation of the assembly of the electric fan and rotary air distributor. Fig. 3 is a front view thereof. Fig. 4 is a view of the parts disassembled. Fig. 5 is an enlarged detail sectional view of the mounting and governing means.

Like parts are indicated by similar reference characters throughout the several views.

While the present invention is applicable to various forms of rotary fans operable in different positions, for illustrative purposes only and with no intent to unduly limit the invention it is illustrated as applied to a conventional form of electric ceiling fan.

In the drawing, 1 is the motor of a typical electric fan, of which 2 are the fan blades, and 3 is the usual fan guard of cage-like construction surrounding the fan blades having at its center a disc 4 from which the guard wires radiate and upon which the rotary deflector or distributor is mounted.

The distributor comprises a peripheral ring 5 upon which are mounted parallel symmetrically arranged blades or vanes 6 extending straight across the unit, but transversely curved outwardly, away from the center of the unit. The respective series of vanes or blades at opposite sides of the center line of the unit are curved outwardly in opposite directions. Attached to and extending medially between the adjacent vanes or blades of the respective series thereof is a bridging bracket 7 supporting a hub 8 in axial position relative to the distributing unit.

Projecting from the fan guard 3 is a trunnion stud 9 attached to the central disc or button 4 of the guard upon which the distributor unit is mounted by means of the hub 8 for rotary motion concentrically with the fan blades 2. The outer portion of the trunnion stud is screw threaded and also flattened or splined on one or opposite sides, to receive thereon non-revoluble cup washers 12 between which is interposed a helical spring 10. The cup washers are retained and adjusted to tension the spring 10 by an adjusting nut 11 upon the screw threaded end of the stud 9. By varying the tension of the spring,

the innermost cup washer 9 is caused to bear with more or less braking pressure upon the end of the hub 8 and thereby control the rate of rotation of the distributor differentially with that of the fan.

The distributor vanes being symmetrically disposed in parallel spaced relation and those at one side of the center being shaped to deflect the air outwardly in opposition to those at the other side of the center, it might be expected that the distributor would assume a balanced condition. Such however is not the case. The whirling or vortical influence of the air currents discharged from the fan acting in like rotative direction upon the vanes at opposite sides of the center with cumulative effect induces a rapid whirling motion of the distributor which is controlled by the adjustment of the tension of the spring 10. If the distributor unit is permitted to rotate at substantially the same speed as the fan blades, the subduing and distribution of the air current will be greatly minimized. However, by retarding the distributor rotation and causing it to turn differentially relative to the speed of the fan, the air currents are directed laterally over a relative wide area and the radial relation of such lateral deflection will be constantly changed, preferably, although not necessarily at a slow speed relative to the rotation of the fan blades.

The device is especially desirable in offices and in homes where the beneficial effect of air circulation and change may be had without the objectionable drafts, and disturbance of papers and light material or objects which would otherwise be blown about.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute, the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown, but that the means and construction herein disclosed comprise the preferred form of several modes of putting the invention into effect, and the invention is therefore claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention, I claim:

1. The combination with a rotary fan adapted to axially discharge a vortical air stream, of an axially offset, symmetrical rotary distributor unit mounted concentrically with the fan including a peripheral ring, a plurality of parallel deflector vanes extending across the ring at opposite sides of the center thereof, the deflector vanes at each side of the center being disposed in contrary deflecting relation, a trunnion stud upon which the distributor is journaled for rotation independently of the fan under the influence of air currents discharged therefrom, a hub upon the distributor engaging the stud, a brake disc on the stud bearing upon the end of the hub, a tension spring surrounding the stud beyond the hub and brake disc and bearing upon the latter and an adjusting nut threaded upon the stud for varying

the tension of the spring to regulate the speed of the distributor relative to that of the fan.

2. The combination with a propeller type rotary fan, of a symmetrical rotary air distributor unit including parallel deflector vanes disposed at opposite sides of the center of rotation of the air distributor unit, the deflector vanes at opposite sides of the center of rotation being oppositely turned to deflect air currents laterally away from each other, and a mounting upon which the distributor unit is mounted for free rotation independently of the fan under influence of the vortical air currents discharged by said fan.

3. The combination with a propeller type rotary fan adapted to axially discharge a vortical air stream, of an axially offset, rotary air distributor mounted for rotation concentrically with the fan, including a hub and deflector vanes arranged in relatively balanced opposed deflecting relation whereby the angle of incidence of one series of vanes is opposed to that of the other series of vanes, a trunnion stud upon which the distributor hub is mounted, a pair of spaced collars on the stud, one of which bears upon the end of the hub with braking effect, a helical spring interposed between the collars, and an adjusting nut screw threaded upon the trunnion stud and bearing upon one of the collars to vary the tension of the spring by adjustment of the nut.

4. The combination of a rotary fan directing air currents parallel to the elements sweeping out a hyperboloid with deflector means normally stationary when under the influence of unidirectional air currents, said means being unsymmetrically arranged with respect to the air currents generated by said fan so as to be rotated thereby.

5. The combination of a rotary fan directing air currents in paths parallel to the elements sweeping out a hyperboloid with deflector means symmetrically arranged with respect to an axial plane of said rotary fan and normally stationary when under influence of unidirectional air currents but unsymmetrically arranged with respect to the air flow propelled by said fan so as to be rotated thereby and adjustable means for changing the relative speed of said deflector means with respect to the speed of the fan.

6. The combination of a rotary fan directing the flow of air in paths parallel to elements sweeping out a hyperboloid with deflector means symmetrically arranged with respect to unidirectional currents flowing parallel to the axis of said fan and normally stationary when under influence of said unidirectional currents but unsymmetrically arranged with respect to the currents propelled by said fan so as to cause the rotation of said means to thereby deflect the air current.

7. An attachment for a propeller type rotary fan adapted to discharge axially a vortical air current comprising a deflector including a rotatably mounted ring, a series of vanes secured to and across said ring, said vanes having wide intermediate deflecting portions and narrow ends arranged at an angle with respect to the axis of the fan so that the leading end of the deflector intersects the vortical air currents and the trailing end is substantially parallel to the vortical air currents so as to rotate the deflector.

8. An attachment for a propeller type rotary fan adapted to discharge axially a vortical air current including a plurality of deflector blades rotatably mounted in pairs on either side of the

axis of the fan, each of said blades including wide medial portions for deflecting air currents and ends inclined with respect to the air currents whereby the leading end intersects the vortical air currents to rotate the blades, the other end extending substantially parallel to the vortical air currents.

9. An attachment for a propeller type rotary fan adapted to discharge axially a vortical air current including a rotatably mounted deflector blade having a wide intermediate portion offset with respect to the axis of the vortex and comparatively narrow end portions sloping in the same direction with respect to the axis of the

vortex so that the leading end intersects the vortical air currents and the trailing end extends substantially parallel thereto, thereby rotating the deflector.

10. An attachment for a propeller type rotary fan axially discharging a vortical air current including a deflector having a rotatably mounted blade offset with respect to the axis of the vortex and angularly disposed thereto, whereby the leading end of the blade intersects the vortical air currents and the trailing end being arranged substantially parallel thereto so as to rotate the blade to deflect the air in various directions.

WALTER A. SPEAR.