Sept. 20, 1938. W. L. KISLING 2,130,802

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Fig. 1.

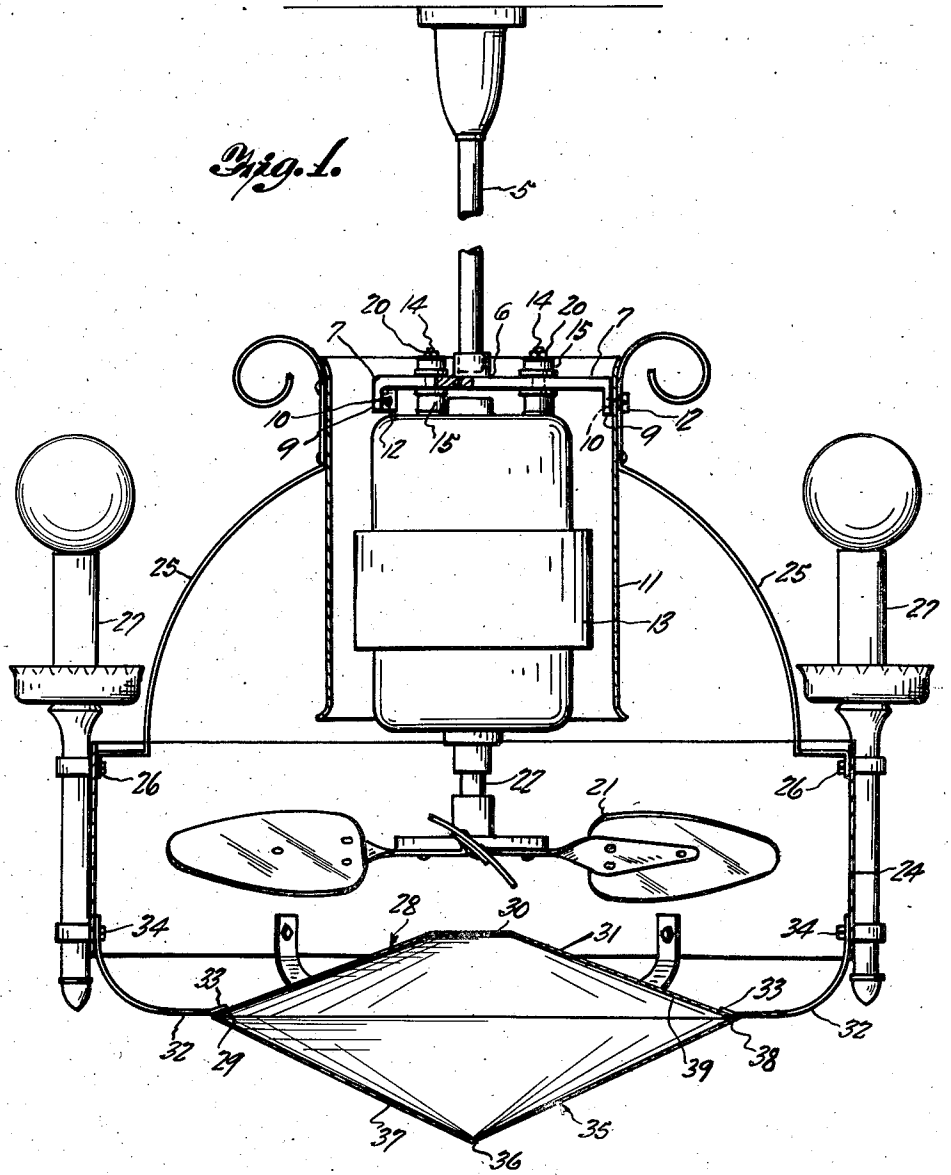
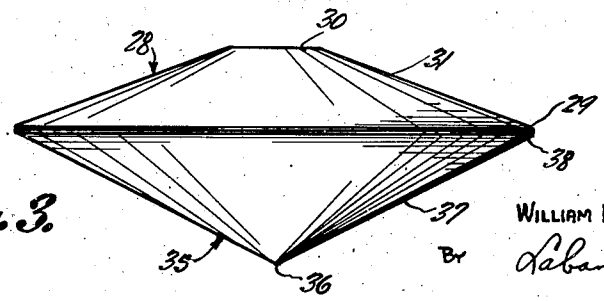


Fig. 3.



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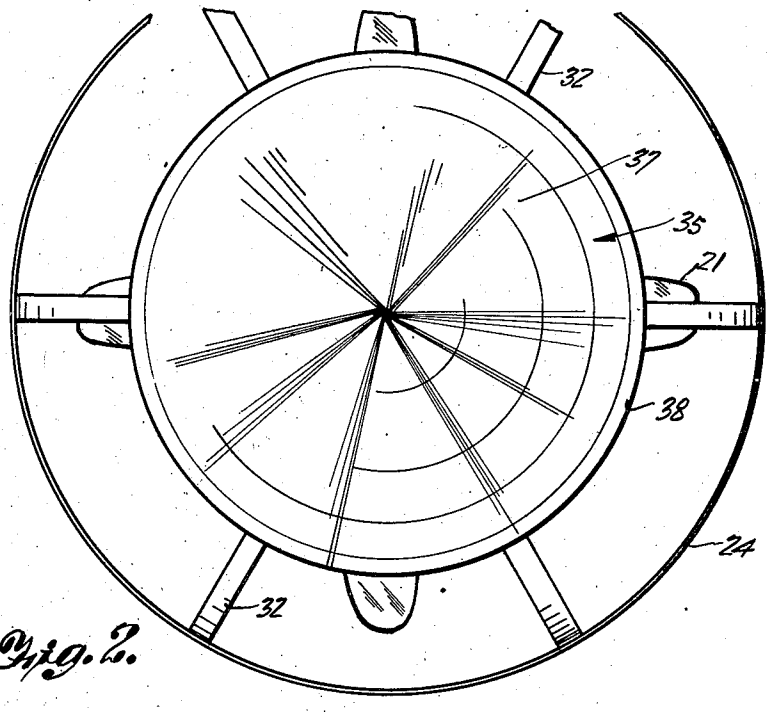


Fig. 2.

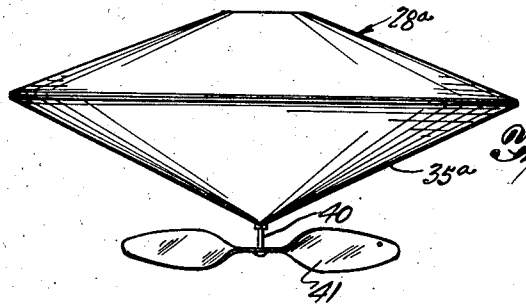
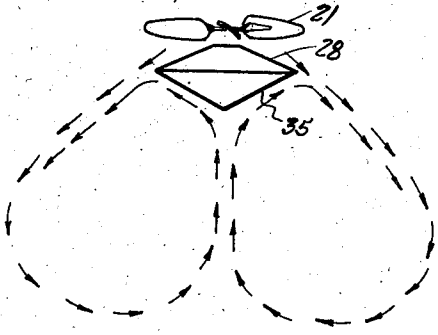


Fig. 5.

Fig. 4.



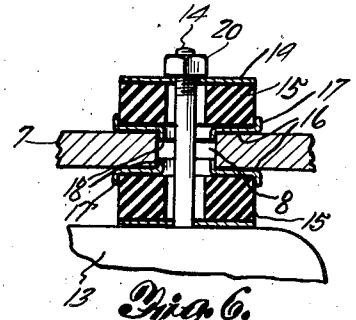


Fig. 6.

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Patented Sept. 20, 1938 2,130,802

UNITED STATES PATENT OFFICE

2,130,802

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William L. Kisling, St. Louis, Mo.

Application April 26, 1937, Serial No. 138,993

1 Claim. (Cl. 230—274)

My invention relates to improvements in air circulating and cooling fans.

The common electric or power driven fan now used for cooling and circulating the air is very ineffective in that it simply directs a relatively narrow blast of air forwardly along the line of its axis and thus its cooling effect is limited to a small area. Furthermore the air is not in reality circulated since it moves in only one direction (away from the fan) and as a result anyone directly in the path of the air will feel an actual draft of air while others outside the field will feel no air movement at all.

In the attempt to widen the field covered by the fan various deflecting elements have been arranged in the path of the air blast and the most effective of these has been a relatively flat conical member placed immediately in front of the fan with its apex next to the fan center so that the air blast impinges the outwardly and forwardly flaring sides of the member. The air is then directed outwardly in all directions and of course covers a wide field. At the same time there results from this arrangement a new and very advantageous movement of the air by which the air is actually set in circulation, moving away from the fan in an outwardly sweeping, swirling motion and then moving inwardly and back toward the fan again. To a limited extent (the reason for this being described hereinafter) this air as it reaches the fan again is drawn outward into the air stream flowing off the deflecting member and continues its circulation. The action thus amounts to a "re-circulation" of the air and the effect can best be described as a gentle, draftless and nondirectional movement which causes a revitalizing and refreshing coolness to be felt equally in all parts of the room.

It is found in practice however that the air has a tendency to pocket in the open, concave side of the deflecting element which of course interferes greatly with the movement of the air back into the direct air stream thus limiting the "re-circulating" of the air as above described. Also since these fans are most expeditiously mounted with the fan axis in a vertical plane and with the apex of the deflecting element upwardly, the concave side of this element is exposed downwardly and has an unfinished appearance detracting from the desirable artistic effect of the fan.

With the foregoing facts in mind it is the main object of my invention to provide an improved form of deflecting member for use with a fan as described and which will cause the desired outward circulation of the air from the fan and will, in addition, greatly facilitate the flow of the circulated air back into the direct air stream flowing off the member for re-circulation therewith. Actual experiments have shown a substantial increase in efficiency brought about by this invention.

Another object is to provide a fan having an improved air deflecting and circulating means which comprises a conical member arranged with its apex adjacent and in alignment with the fan axis with its sides flaring outwardly in the direction of air travel from the fan and, in connection therewith, another conical member reversed in position so that its apex is turned toward the air returning to the fan to direct this air out again into main air stream.

Another object is to provide an air deflecting and circulating element of this kind in the form of a double cone with oppositely turned apices so that air striking either end, as it were, will be directed outwardly to merge at the center in a common plane. Such an assembly supported in a stream of air from the fan with one apex turned toward the fan will deflect the air outwardly in all directions as will be evident. When this assembly is located overhead with the air stream directed downwardly the outward diversion thereof will cause the air to reach the outermost confines of the room and then turn inwardly along the floor picking up the coolest air therefrom. Under the influence of continuation of this motion the air moves upwardly again toward the fan and impinging the lower apex of the deflecting element is diverted thereby outwardly to enter the main air stream again. In this manner the air is continuously circulated and re-circulated. As the air reaches the fan on its return from the floor it will be noted that by my invention it meets an element designed to smoothly and expeditiously guide it back into the main air stream without any resistance whatever, whereas in the past the air has met with an actual pocket formed by the concaved lower face of the deflecting element. The continuous circulation of the air is therefore obviously facilitated and enhanced. Inasmuch as the air stream flowing off the deflecting element direct from the fan of course is stronger than the return stream there is set up a suction acting at the edge of the element which aids the action of my invention in that it draws the return air out to the direct air stream for re-circulation therein whereas in the previous structure this action has only created a vacuum beneath the

fan which furthered the formation of the air pocket aforesaid. Thus in all respects my "double-ended" deflecting element is of advantage over the hitherto used single element and additionally enhances the appearance by giving a finished effect to the assembly. In fact, my structure makes possible an entirely new principle of air re-circulation not hitherto conceived of nor possible.

Another object of my invention is to provide an improved fan assembly as a whole wherein not alone is my improved deflecting element and principle embodied but wherein this element, the fan and its motor are all enclosed and protected by an ornamental and attractive housing which may carry the lights for the room as well as the fan and in which is included an improved motor mounting means supporting the motor resiliently so that no vibration can be transmitted to the fan and housing.

With these and other objects in view the invention resides in the novel construction and arrangement of parts as hereinafter fully set forth and claimed, reference being had to the accompanying drawings as showing preferred embodiments of my invention for purposes of exemplification.

In the drawings:

Figure 1 is a vertical cross sectional view through an entire fan assembly constructed in accordance with my invention.

Figure 2 is an inverted plan view of the fan.

Figure 3 is a side elevation of the improved deflecting member alone.

Figure 4 is a diagrammatic view on a reduced scale showing the action of the air moved by the fan.

Figure 5 is a view similar to Figure 3 showing a modified form of the invention.

Figure 6 is an enlarged cross sectional detail view of the resilient motor mounting.

In carrying out my invention as shown in the drawings I provide a supporting column 5 adapted to be suspended from the ceiling in well known manner and attach to the lower end thereof a crowfoot 6 having radially extending arms 7 apertured at 8 near their outer ends and having their extremities 9 turned downwardly and provided with tapped holes 10. This crowfoot 6 supports the whole assembly and is enclosed and concealed by a cylindrical housing 11 affixed to the ends 9 by screws 12 as shown. The electric motor 13 is supported within (and concealed) by this housing 11 by studs 14 extended from the upper end of the motor and passed loosely through the openings 8 in the crowfoot. Rubber collars 15 are placed on the studs 14 above and below the crowfoot arms 7 and while engaging the studs nicely are themselves spaced from the arms by washers 16 which have marginal rims 17 enclosing the edges of the collars and inner flanges 18 which engage the openings 8 and center the studs out of any contact with the arms 7. A washer 19 is placed a top each assembly and nuts 20 are screwed on the studs. In this manner the motor is suspended entirely on rubber and will not transmit any vibration to the crowfoot and parts supported thereby.

A fan 21 of any suitable form and size is secured to the depending shaft 22 of the motor 13 and turns below the housing 11. The fan is itself enclosed around its outer side by an annular shell or drum 24 of greater diameter than the fan and which is suspended from the housing 11 by radially extending and flaring arms 25 secured at their upper ends beneath the screws 12 and at their lower ends secured by screws 26 to the upper rim of the shell. This shell 24 is located at a level just below the lower end of the housing 11 and thus while both the motor 13 and fan 21 are concealed and protected by these parts there still is left more than adequate space for air circulation around the fan.

Both the housing 11 and the shell 24 may be very attractively ornamental in both shape and finish and lamp sockets, as at 27, may be mounted on the assembly so that it combines the functions of fan and lighting fixture or chandelier.

The structure so far recited of course will operate to direct a blast of air directly downwardly from the fan thus having only a limited field of usefulness and causing only a single current of air without any circulation of the air around the entire room.

To bring about a deflection of the air all about the room a deflecting member, plate or head 28 is provided, the same being in the form of a relatively flat truncated cone of any suitable diameter at its outer margin 29. The flattened apex 30 of this plate is located beneath and at the center or axis of the fan 21 and the sloping and firing sides 31 then extend outwardly below the fan blades as shown. The plate is supported in this position by arms 32 secured at 33 to the rim or margin 29 of the plate and extended radially outward and turned upwardly inside the shell 24 where they are secured at 34. By this arrangement the plate 28 is supported slightly below the level of the shell 24 which facilitates the flow of air off the plate without interference from the shell.

Now as the air thrown downward from the fan strikes the plate 28 it is deflected laterally and outwardly in all directions and sets up a downwardly and outwardly sweeping motion as indicated by the arrows in Figure 4. This motion then turns into an inwardly and upwardly moving stream also as shown in the same view and the air finally reaches the fan again after having made a complete circuit out to the walls and across the floor of the room as will be understood.

To take this upwardly moving already circulated air and recirculate it causing it to reenter the air stream flowing off the plate 28, I provide another cone shaped plate or member 35 which is mounted in an inverted position below the plate 28. This plate 35, hereinafter termed the lower plate, is not truncated and has its pointed apex 36 turned downward with the sides 37 flaring outwardly and upwardly to the rim or margin 38. The rims 29 and 38 of the two plates are secured together in any suitable manner as by welding making a unitary assembly of the whole.

With the addition of this lower plate 35 the air flowing upwardly toward the fan meets the plate and is directed thereby out in a radial direction off the rim 38 where it meets the relatively stronger current of air flowing past direct from the fan and merges therewith. The air is thus re-circulated constantly about the room so long as the fan is in operation and the effect is a revitalizing freshing of the air which cools the whole room without causing a draft at any point.

Heretofore only the upper plate 28 has been used and as a result the concave lower face 39 thereof has been exposed not alone to the detriment of the appearance of the unit, but, more important, to the hindrance of the circulation

of the air. This for the reason that the upwardly moving current of air upon reaching the plate would form a pocket in this concavity and to a great extent would not reenter the air stream from the fan. Furthering this action the rush of air off the margin of the plate would have a tendency to form a relative vacuum below the plate. The use of another inverted plate as I do however completely eliminates the air pocket and all the air reenters the direct air stream being directed thereinto by the shape of the plate and at the same time socket into the stream as it rushes off the upper plate. In fact, the lower plate **35** streamlines the assembly and so doing of course facilitates and guides the flow of air past the plate in the desired direction.

Actual tests have shown there to be a considerable force in the air flowing up to the center of the fan and in Figure 5 is shown a means whereby advantage of this force is taken to further increase the circulation. In this assembly the upper and lower plates **28***a*—**35***a* are as described hereinbefore but from the center of the lower plate a small shaft **40** is depended and a small fan **41** is journaled thereon. This fan **41** thus may turn in a horizontal plane and under the influence of the upwardly moving air flow will be set in motion. As a result this air stream will be thrown outward into the direct air stream and at the same time the velocity and force of the upward stream will be increased to some extent at least by the rotation of this fan.

It is submitted that this principle of circulation and recirculation of air by an overhead fan has not been conceived before this invention even though a conical plate has been used in connection with fans of various kinds. In fact due to the formation of an air pocket as described in the face of the single plate a real and tangible re-circulation has not been possible. It is further thought that the assembly of the fan as a whole is new and is of advantage not only from the standpoint of appearance but also for the reason that the shell surrounding the fan aids the operation by confining the air flow so that it all must needs strike the deflecting element.

The bringing of the apex of the lower plate **35** to a point is important so that no obstruction will be formed to hinder the directing of the air equally out into the direct air stream for recirculation.

While I have herein set forth certain preferred embodiments of my invention it is understood that I may vary from the same in minor structural details so as best to provide a practical device for the purposes intended, not departing from the spirit of the invention and within the scope of the appended claim.

I claim:

An overhead circulating fan assembly comprising, a support, a fan and motor suspended from the support with the fan arranged to operate in a horizontal plane beneath the motor, an annular fan guard shell supported around the fan, a double cone deflector member supported below the fan and comprising an upper conical member having its apex turned upwardly toward the fan, and a lower conical member having its apex turned downwardly away from the fan, the base of the cones being secured together and being of smaller diameter than the said shell, and arms extended radially between the shell and the junction between the cones for supporting the cones concentrically with respect to the shell.

WILLIAM L. KISLING.