ABSTRACT

A space saving fan for desktop use is provided. The device includes a compact motorized impeller, a front elevation plate and/or a light dissemination plate for improved and efficient illumination of a room or work surface.
SPACE SAVING FAN WITH FRONT ELEVATION/ILLUMINATION PLATE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This Application claims the benefit of Application No. 60/794,643, filed Apr. 24, 2006, the entirety of which is incorporated herein by reference.

TECHNOLOGY FIELD

[0002] This invention relates generally to portable desk top fans. More particularly, the present invention relates to a structure for a fan that will enhance and improve work area function and not be detracting to persons working in the vicinity of the fan

BACKGROUND

[0003] The need to cool a human when sitting at a work area, such as for example a desk, table or work bench, has been long established. Industry has responded to this need with the use of small fans and cooling devices. The conventional devices may indeed permit some relief, however they have several shortcomings.

[0004] One such shortcoming is the ability to have non-disruptive or non-distracting apparatus within the work area. Employers are constantly searching for methods to improve the employee work environment. Entire industries of office furniture and appliances have emerged in response to this need. Conventional desk fans utilizing standard impellers, motors and protective grills can be disruptive to the work area environment, having a net negative effect on the employee. Conventional desk fans located in close proximity to a user tend to be disruptive while functioning. The structural size required to protect the rotating impeller and the distracting rotational movement of the impeller of conventional desk fans does not complement the work environment. Conventional desk fans have little to commend them to the user and may contribute to a loss in productivity.

[0005] Another disadvantage of conventional desk fans is the excessive volume of air produced. Since such devices are located close to the user, the excess air volume serves to disturb objects from there intended place. For example, papers, notes and other light objects can easily be dislodged from work surfaces. The production of this excess volume of air also needlessly wastes energy.

[0006] Another disadvantage of conventional desk fans that use conventional impellers and motor configurations is the need of a large base for stabilization. The large base often requires the user to sacrifice a portion of work surface. A desk or table top has a limited surface area and most of the area ideally is used for productive gains instead of being occupied by a conventional desk fan. Many conventional desk fans using conventional impellers and motor configurations often require a dimensional depth and height that tends to impair the user’s ability to see the area around the device. In addition, the required height makes these devices more susceptible to accidental contact and tip-over. Accidental tip over can cause time and work loss.

[0007] Conventional desk fans that are widely available in the market have no real differentiation to attract attention in the consumer market. This lack of differentiation not only produces a lack of choice for the consumer but zero marketing “novelty” for the manufacturer and/or vendor.

SUMMARY

[0008] In light of the aforementioned shortcomings there is a need for a fan that may be presented on a desk or work area with a new and an improved structure and space saving form. The size of the space saving fan, as described, has been minimized to conserve the area of a work area, such as a desk or table top. Although the size of the space saving fan may be reduced, the structure of the device improves the functionality and usefulness of the device.

[0009] The use of a small impeller and motor configuration further allows the overall depth of the device to be reduced, thus maximizing the available area on a work surface for productive use. The physical location of the motor relative to the impeller permits greater space saving characteristics than those found in a conventional desk fan.

[0010] The space saving fan of the present invention may also included features to enhance the efficiency of generating air flow with a velocity capable of cooling the user. The cooling effect of air movement is proportional to the velocity of the air. Higher velocities increase the ability of the air to impinge a surface, such as for example, the user’s skin and thus increase the evaporative cooling effect. Ideally, the air flow velocity will be generated in an energy efficient manner without the need to move an excess volume of air.

[0011] The space saving fan in accordance with embodiments of the present invention may also included a front elevation plate that is not distracting to the user and that may permit a more attractive and evocative presence on a desk or table top. The dimensional structure of the front elevation plate provides space saving characteristics to conserve the usable work area on a desk or table top. The dimensional structure of the front elevation plate does not obstruct the user’s ability to see the area around the device. These advantages provide a non-disruptive and non-distracting device that promote a more efficient use of the limited surface area on a desk or table top.

[0012] In accordance with other embodiments of the invention, the structure of the front elevation plate may allow the use of indirect or low level lighting to provide additional functionality and enhance the overall appearance of the device. The use of light emitting diodes (LED) in conjunction with a front elevation plate functioning as a light dissemination plate further commend the device to the user. The use of a LED in lieu of a common incandescent light source reduces both the heat produced and the energy consumed by the device.

[0013] The structural and feature innovations of the invention also achieve the goal of re-invigorated interest on the part of the user and sale-ability on the part of the manufacturer and/or vendor.

[0014] Additional features and advantages of the invention will be made apparent from the following detailed description of illustrative embodiments that proceeds with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The invention is best understood from the following detailed description when read in connection with the accompanying drawing. It is emphasized that, according to common practice, the various features of the drawing are not...
to scale. On the contrary, the dimensions of the various features are arbitrarily expanded or reduced for clarity. Included in the drawing are the following Figures:

**FIG. 1** is a perspective view of an exemplary embodiment of the space saving fan in accordance with the present invention;

**FIG. 2** is an exploded view of the space saving fan of FIG. 1;

**FIG. 3A** and **3B** are top and side views respectively of the embodiment of FIG. 1;

**FIG. 4** is a perspective view of another exemplary embodiment of a space saving fan in accordance with the present invention.

**FIG. 5** is a perspective view of another exemplary embodiment of a space saving fan;

**FIG. 6** is a perspective view of another exemplary embodiment of a space saving fan;

**FIG. 7** is an exploded view of the space saving fan of FIG. 6;

**FIG. 8** is a vertical cross section through the space saving fan of FIG. 6;

**FIG. 9A** is a partial perspective view of an exemplary embodiment of a space saving fan;

**FIG. 9B** is a cross section view along plane 9-9 of FIG. 9A;

**FIG. 10A** is a partial perspective view of another exemplary embodiment of a space saving fan;

**FIG. 10B** is a cross section view along plane 10-10 of FIG. 10A;

**FIG. 11A** is a partial perspective view of another exemplary embodiment of a space saving fan;

**FIG. 11B** is a cross section view along plane 11-11 of FIG. 11A;

**FIGS. 12A** and **12B** are partial cross sectional views of another exemplary embodiment of a space saving fan;

**FIGS. 13A** and **13B** are partial cross sectional views of another exemplary embodiment of a space saving fan; and

**FIGS. 14A** and **14B** are partial cross sectional views of another exemplary embodiment of a space saving fan.

**DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS**

**FIG. 1** is a perspective view of an exemplary space saving fan **100**. Space saving fan **100** includes air generator **120**, front elevation plate **140** and support **150**. As shown, air generator **120** may be located in a centralized portion of front elevation plate **140**. Support **150** attaches to front elevation plate.

**FIG. 140** includes, outer edge **144**, inner edge **143**, outer edge **144**, rear surface **146** and a front surface **148**. Front elevation plate **140** may be constructed of clear or translucent glass or polymer material, such as, for example, poly carbonate. As shown, support **150** and a bottom portion of outer edge **144** may be used to support the structure of space saving fan **100** in an upright position.

**FIG. 150** The use of a transparent or clear material in the construction of front elevation plate **140** contributes to the unobstructive appearance of space saving fan **100** when places on a desk or other work surface. As can be appreciated, objects, such as for example, pencil **180** can be seen through front elevation plate **140**, thereby allowing the perceived size and obstructiveness of space saving fan **100** to be minimized.

**FIG. 170** may be used to connect space saving fan **100** to a power source, such as for example, a standard wall receptacle (not shown). Power cord **172** transfers power from plug **170** to air generator **120**. As shown in FIG. 1, plug **170** may include a transformer **174** thereby indicating the use of direct current (DC) power by air generator **120**. The transformer of plug **170** may be a conventional wound coil type transformer or electronic switching type transformer. The electronic switching transformer has several advantages when compared to the wound coil transformer. The ability to include safety features such as, for example, over current monitoring can easily be incorporated into the design of an electronic switching transformer. Another advantage of an electronic switching transformer is a lower cost when compared to the wound coil transformer. The lower cost and increased safety augments the market appeal of space saving fan **100**. It is contemplated that direct current or alternating current could be used to power air generator **120**.

**FIG. 2** is an exploded view of space saving fan **100**. As shown, air generator **120** may include housing **122**, rear grill **124**, front grill **126** and motorized impeller assembly **130**. When air generator **120** is assembled, motorized impeller assembly **130** may be disposed within cavity **123** defined by housing **122**. Rear grill **124** and front grill **126** are shown located on the opposite ends of cavity **123**, and work in conjunction with housing **122** to safely enclosing motorized impeller assembly **130**. Rear grill **124** and front grill **126** may be fastened to housing **122** using conventional means, such as for example, adhesives, screws, snap fits and the like. It is also contemplated that one or both of rear grill **124** and front grill **126** may be partially or completely unitary with another component of space saving fan **100**, such as for example, housing **122** or front elevation plate **140**.

**FIGS. 2** Although not shown, it is contemplated that switches, wires, power cords, batteries, and other such well known electrical devices will be utilized to supply and control the energy required for motorized impeller assembly **130**.

**FIGS. 2** Front elevation plate **140** includes opening **142**, internal edge **143**, outer edge **144**, rear surface **146** and front surface **148**. Air generator **120** may be disposed in opening **142** of front elevation plate **140** upon assembly. Air generator **120** may be attached to front elevation plate **140** using conventional means, such as for example, adhesives, screws, snap fits and the like. It is also contemplated that front elevation plate **140** may be partially or completely unitary with another component of space saving fan **100**, such as for example, housing **122**.

**FIGS. 2** As shown support **150** may be attached to rear surface **146** of front elevation plate **140**. Support **150** may be attached via conventional means, such as for example, adhesives, screws, snap fits and the like. It is also contemplated that support **150** may be removably or rotatably attached to elevation plate **140** and/or may be attached to the front surface of front elevation plate **140**. As can be appreciated, removable or rotatable attachment of support **150** to front elevation plate **140** will contribute to efficient packaging and shipment of space saving fan **100**.

**FIGS. 2** FIG. 3A and 3B are top and side views respectively of the embodiment of space saving fan **100** of FIG. 1. Front elevation plate **140** supports air generator **120** relative to
support surface 300. As shown, front elevation plate 140 may be defined by dimensions FW, FH and FD. FW is the horizontal width of front elevation plate 140, FH is the vertical height of front elevation plate 140, and FD is the thickness of front elevation plate 140. Air generator 120 may be defined by dimensions AGW, AGH and AGD. AGW is the horizontal width of air generator 120, AGH is the vertical height of air generator 120, and AGD is the thickness of air generator 120. As shown, the overall dimensions of space saving fan 100 is defined by FW, FH and OAD. OAD is measured perpendicular to FW along a horizontal plane.

[0042] Limiting the dimensions contribute to the space savings and utilitarian characteristics of space saving fan 100. More specifically, limiting the thickness FD of front elevation plate 140 increases the ability of the user to view around the device. The limitation of thickness FD combined with the limited thickness AGD of air generator 120 minimizes the depth of the device and further conserves space on a desk or work surface. In one embodiment, FD is less than 15% of either FW or FH.

[0043] Limiting the thickness FD of front elevation plate 140 in conjunction with the use of clear or translucent glass or polymer materials increases the ability to view object behind the front elevation plate 140 and hence the non-distracting value of elevation plate 140 (e.g., allowing the full work surface to be viewed). The ability of front elevation plate 140 to collect, reflect, diffuse and/or refracting ambient light is enhanced by the limited dimension for thickness FD. Preferably, ambient light may easily penetrate front elevation plate 140. The full penetration of ambient light into front elevation plate 140 increases the illumination that the ambient light is able to effect on front elevation plate 140. Further enhancements can be achieved with the inclusion of pale tints within the clear or translucent material. The addition of tints provides an edge glow effect with subtle color intensification at edge 144. The subtle color intensification may provide a radiant glow at edge 144. These light dissemination features differentiate space saving fan 100 from conventional space saving fans and increase the non-distracting value of space saving fan 100 when compared to conventional desk fans.

[0044] Although shown in a specific profile, front elevation plate 140 is not so limited. It is contemplated that front elevation plate 140 may have a variety of shapes, for example, polygonal, elliptical, free form and the like, without departing from the spirit of the invention. It is also contemplated that outer edge 144 of front elevation plate 140 may have various surfaces textures and finishes, such as for example, serrations, waves, bevels, angles and the like.

[0045] FIG. 4 is a perspective view of another exemplary space saving fan 400. As shown, space saving fan 400 includes air generator 420, front elevation plate 440 and support 450. Space saving fan 400 may be similar in other respects to space saving fan 100 of FIG. 1, except that front elevation plate 440 may be constructed of multiple sections 440a and 440b. Although the exemplary embodiment of front elevation plate 440 shown in FIG. 4 includes two sections 440a and 440b, the invention is not so limited. It is contemplated that front elevation plate 440 may be constructed of any number of sections in various shapes and sizes without departing from the spirit of the invention.

[0046] FIG. 5 is a perspective view of another exemplary space saving fan 500. As shown, space saving fan 500 includes air generator 520, front elevation plate 540 and support 550. Space saving fan 500 is similar in other respects to space saving fan 100 of FIG. 1, except that front elevation plate 540 may include an alternative shape, for example, triangular. Support 550 may be constructed to have similar characteristics as front elevation plate 540.

[0047] FIG. 6 is a perspective view of another exemplary space saving fan 600. Space saving fan 600 includes air generator 620, light dissemination plate 640 and support 650. As shown in the exemplary embodiment light dissemination plate 640 is similar to front elevation plate 140 of FIG. 1, however light dissemination plate 640 is capable of emitting a low intensity light utilizing one or more light sources 628 as shown in FIG. 7. As shown, air generator 620 is preferably located in a centralized portion of light dissemination plate 640. Support 650 may attach to light dissemination plate and support the entire structure of space saving fan 600 in an upright position.

[0048] FIG. 7 is an exploded view of space saving fan 600 from FIG. 6. As shown, air generator 620 includes housing 622, rear grill 624, front grill 626, one or more light sources 628 and motorized impeller assembly 630. When air generator 620 is assembled motorized impeller assembly 630 is disposed within cavity 623 defined by housing 622. Rear grill 624 and front grill 626 may be located on the opposite ends of cavity 623, and in combination with housing 622 safely enclose motorized impeller assembly 630. Rear grill 624 and front grill 626 may be fastened to housing 622 using conventional means, such as for example, adhesives, screws, snap fits and the like. It is also contemplated that one or both of rear grill 624 and front grill 626 may be partially or completely unitary with another component of space saving fan 600, such as for example, housing 622.

[0049] As shown, light sources 628 may be disposed within pockets 629 and located near outside surface 625 of housing 622. As shown, the location of light sources 628 and pockets 629 coincide with internal edge 643 of light dissemination plate 640 when space saving fan 600 is completely assembled. The exemplary embodiment shows four light sources 628, the invention however is not so limited. It is contemplated that one or multiple light sources 628 may be used without departing from the invention.

[0050] It is contemplated that light sources 628 may be miniature lights, neon lights, light emitting diodes (LEDs) and the like. In a preferred embodiment, light source 628 uses LED technology. The use of LED technology has several advantages. First, the power usage is low compared to other types of light sources. Also, the life span of an LED is much greater than other light sources. In addition, the construction of the LED is simple when compared to other conventional lighting technologies, such as for example, incandescent lights that require several components, such as, sockets. Further, the use of LEDs for light sources 628 in conjunction with light dissemination plate 640 creates a compact light emission structure that can easily be crafted into any shapes and sizes.

[0051] Although not shown it is contemplated that switches, wires, power cords, batteries, and other such well known electrical devices will be utilized to supply and control the energy required for both motorized impeller assembly 630 and light sources 628. Preferably, these electrical components are located safely behind light dissemination plate 640.

[0052] Air generator 620 may be disposed in opening 642 of light dissemination plate 640 upon assembly. As noted
before, light sources 628 should align with internal edge 643 of light dissemination plate 640.

[0053] As shown, light dissemination plate 640 includes opening 642, internal edge 643, outer edge 644, rear surface 646 and front surface 648. Light dissemination plate 640 is preferably a good conductor of light. Preferably, light dissemination plate 640 is constructed of glass or a clear polymer material such as poly carbonate. Air generator 620 may be attached to light dissemination plate 640 using conventional means, such as for example, adhesives, screws, snap fits and the like. It is also contemplated that light dissemination plate 640 may be partially or completely unitary with another component of space saving fan 600, such as for example, housing 622.

[0054] As shown in FIG. 7, light dissemination plate 640 may attach to support 650 via notches 652. As shown outer edge 644 of light dissemination plate 640 will fit within notches 652. In a preferred embodiment, light dissemination plate 640 may be removably attached to support 650. It is also contemplated that light dissemination plate 640 may be permanently attached to support 650 using conventional means, such as for example, adhesives, screws, snap fits and the like.

[0055] Although shown as circular in form, light dissemination plate 640 is not so limited. It is contemplated that light dissemination plate 640 may have a variety of shapes, for example, polygonal, elliptical, free form and the like without departing from the spirit of the invention. It is also contemplated that outer edge 644 of light dissemination plate 640 may have various surfaces textures and finishes, such as for example, serrations, waves, bevels, angles and the like.

[0056] FIG. 8 is a vertical cross section through space saving fan 600. As shown, motorized impeller assembly 630 includes impeller 631, stator 632, rotor 633, shaft pin 634, stationary frame 635 and bearings 636. As shown, motorized impeller assembly 630 utilizes A.C. motor technology including stator coils 632a, stator laminations 632b, rotor inductor 633a and rotor laminations 633. Although space saving fan 600 is shown using A.C. motor technology the invention is not so limited. It is contemplated that D.C. motors, permanent magnet motors and other conventional motor types could be used without departing from the spirit of the invention.

[0057] Impeller 631 may be attached to rotor 633 using shaft pin 634. As shown impeller 631 includes hub 631a and blades 631b. Bearings 636 may be attached to stationary frame 635, which in turn may be fixedly attached to front grill 626. Shaft pin 634 may be rotatably disposed through bearings 636 allowing impeller 631, rotor 633 and shaft pin 634 to rotate relative to bearings 636, stationary frame 635 and the rest of the components of space saving fan 600.

[0058] When electrical power is supplied to stator coils 632a, rotor 633 rotates thereby rotating impeller 631. The rotation of impeller 631 generates air flow 800. As shown, air flow 800 enters housing 622 through rear grill 624, is accelerated by impeller 631, and exits space saving fan 600 via front grill 626. In a preferred embodiment, light dissemination plate 640 may be mounted at an angle relative to support 650. Inclination of air stream 800 relative support surface 802 helps avoid or reduce disturbance of objects resting on support surface 802. It is also contemplated that the incline of air stream 800 may be adjustable relative to support surface 802.

[0059] In the present exemplary embodiment, stationary frame 635 is attached to front grill 626 with fasteners 660. It is also contemplated that other conventional means, such as for example, adhesives, snap fits and the like may be used. It is also considered that stationary frame 635 may be partially or completely unitary with another component of space saving fan 600, such as for example, rear grill 624 or front grill 626.

[0060] The location of stator 632, rotor 633, shaft pin 634, stationary frame 635 and bearings 636 within hub 631a of impeller 631, permits a conservation of size for motorized impeller assembly 630. This further contributes to the space saving characteristics of space saving fan 600. As can be appreciated, the diameter and or size of light dissemination plate 640 is greater than the axial thickness of air generator 620. In one embodiment, the ratio of the diameter light dissemination plate 640 to the axial thickness of air generator 620 is greater than 2 to 1.

[0061] Although not shown, it is contemplated that space saving fan 600 may also include additional features, such as for example, air filtration, heaters, clocks, oscillation, storage compartments and the like. It is also contemplated that support 650 may be an elevating structure, such as for example, a pedestal to increase the elevation of air flow 800 produced by air generator 620 above support surface 802.

[0062] FIG. 9A is a partial perspective view of an embodiment of space saving fan 600. FIG. 9B is a view of a cross section cut through the partial perspective view of FIG. 9A along plane 9-A. As shown, light vector 900 may be the predominant direction of travel of light through light dissemination plate 640.

[0063] As shown in FIGS. 7, 9A and 9B, light sources 628 may be located near internal edge 643 of light dissemination plate 640. The majority of the light may be maintained between rear surface 646 and front surface 648 and travels in an outward or radial direction between rear surface 646 and front surface 648. In a preferred embodiment, rear surface 646 and front surface 648 are flat and smooth and the angle of incidence of the light is high relative to rear surface 646 and front surface 648, thereby reflecting the majority of light vector 900 along a radial path from internal edge 643 towards outer edge 644.

[0064] The angle of incidence is the angle between a light beam incident on a surface and the line perpendicular to the surface at the point of incidence. The optical phenomenon, internal reflection will occur within light dissemination plate 640 as light vector 900 strikes rear surface 646 and front surface 648 at an angle of incidence greater that the critical angle. The critical angle is the angle of incidence above which the internal reflection occurs. This phenomenon of reflectivity and angle of incidence is widely known and described from Fresnel’s equations.

[0065] In another embodiment, rear surface 646 and front surface 648 may be coated with a reflective material. Reflective materials may further enhance the light transport and guide characteristics of the light dissemination plate 640.

[0066] As shown in FIG. 9B, light vector 900 may exit light dissemination plate 640 through outer edge 644 due to the high angle of incidence between light vector 900 and outer edge 644. It is contemplated that outer edge 644 may have a textured surface, thereby diffusing the light as it exits light dissemination plate 640 giving a glowing appearance to outer edge 644.
Other light exit points may be provided on, for example, the front surface 648 of the light dissemination plate 640. These points of use may include a diffuser for spreading and/or directing the light into the room and/or onto the work surface.

FIG. 10A is a partial perspective view of another embodiment of space saving fan 600. FIG. 10B is a view of a cross section cut through the partial perspective view of FIG. 10A along plane 10-10. As shown, light vector 900 may be the predominant direction of travel of light through light dissemination plate 1040. FIGS. 10A and 10B include an additional surface treatment 1000 on rear surface 646. Surface treatment 1000 may include the texturizing of rear surface 646, paint, and/or an additional surface attached to rear surface 646. For example, a paint containing reflective glass beads, an adhesive material with reflective properties, mirrors, and the like could be used as surface treatment 1000.

Although the majority of light vector 900 may exit light dissemination plate 1040 through outer edge 644, a portion of light, shown as reflected vectors 1002, may be directed at an angle θ to rear surface 646 and cause rear surface 646 to be visible through front surface 648. As shown, the reflected vectors 1002 may be directed substantially perpendicular to rear surface 646. The reflectivity of rear surface 646 may be increased or decreased with various surface treatments 1000 including the amount of texturization, type of texturization and the quantity and size of glass beads in the paint or adhesive material, etc.

FIG. 11A is a partial perspective view of another embodiment of space saving fan 600. FIG. 11B is a view of a cross section cut through the partial perspective view of FIG. 11A along plane 11-11. As shown, light vector 900 may be the predominant direction of travel of light through light dissemination plate 1140.

FIGS. 11A and 11B, include an additional reflective feature 1100 on rear surface 646. Reflective feature 1100 may include numbers, letters, symbols and various graphics recessed into light dissemination plate 1140 on rear surface 646. Further, the surface of reflective feature 1100 may be texturized or the recess may contain a filler 1104, such as for example, a paint or epoxy containing reflective glass beads, mirrors, and the like.

Although as shown the majority of light vector 900 may exit light dissemination plate 1140 through outer edge 644, a portion of light, shown as reflected vectors 1102, may be directed at an angle θ to rear surface 646 by reflective feature 1100 and thus causing reflective feature 1100 to be visible through front surface 648. As shown, reflected vectors 1102 may be directed substantially perpendicular to rear surface 646 by reflective feature 1100. The visibility of reflective feature 1100 may be increased or decreased with various types of texturization and the amount of glass beads in filler 1104, the intensity of the light source, etc. It is also contemplated that colors may be added to reflective feature 1100 to convey different moods and contribute to its aesthetic appeal.

In one embodiment angle α1 of FIG. 12A and/or angle α2 of FIG. 13A is greater than about 180°. In another embodiment angle α1 of FIG. 12A and/or angle α2 of FIG. 13A is between about 140° and about 270°.

The location of light source 628 as shown and described in FIGS. 13A and 13B has advantages over the location of light source 628 as shown and described in FIGS. 12A and 12B. For example, the increased angle of angle α2 permits a more uniform light distribution throughout light dissemination plate 640. When compared to the embodiment of FIGS. 12A and 12B, the embodiment of FIGS. 13A and 13B would require fewer light sources 628 around internal edge 643 of light dissemination plate 640 to achieve complete illumination of light dissemination plate 640. This reduces both the assembly and material costs associated with space saving fan 600.

Another advantage of the use of light shrouds 1310 as described in FIGS. 13A and 13B is the ability to utilize...
a reflective surface on light shrouds 1310 in the areas of interface between light shrouds 1310 and rear surface 646 and/or front surface 648 of light dissemination plate 640. The use of reflective surfaces helps preserve the intensity of light vectors 900 thereby increasing/improving the illumination of light dissemination plate 640. The increased/improved illumination may permit the use of lower power light sources 628, thereby conserving energy and expense.

[0081] FIGS. 14A and 14B are partial cross sections of another embodiment of space saving fan 600. FIGS. 14A and 14B are similar to FIGS. 13A and 13B in other respects except for the configuration of pocket 1429. As shown, pocket 1429 may be circular in form and substantially larger than the size of light source 628. It has been found that the circular form of pocket 1429 and a comparatively larger size with respect to the size of light source 628 increases the angular range through which light vectors 900 are able to radiate. As shown, the angular range of radiation of light vectors 900 is about 360°. It has also been found that this configuration of light source 628 and pocket 1429 creates a more homogeneous light radiation throughout light dissemination plate 640 when compared to FIGS. 12A and 12B and/or FIGS. 13A and 13B.

[0082] Further, internal edge 643 and/or outside surface 625 of housing 622 may include a reflective material. Light vectors radiating toward this reflective material may be reflected back into the light dissemination plate 640. This feature further improves light radiation throughout light dissemination plate 640.

[0083] In one embodiment the diameter of pocket 1429 is greater than about 2 times the cross sectional width of light source 628. In another embodiment, the diameter of pocket 1429 is greater than about 0.30 inches. In yet another embodiment the diameter of pocket 1429 is between about 0.25 inches and about 0.75 inches.

[0084] The features and structure of space saving fan 100 and 600, as described in the exemplary embodiments, enhance space saving characteristics when compared to conventional desk and table fans. The physical location of the motor relative to the impeller permits greater space saving characteristics than those found in a conventional desk fan. The use of motorized impeller assembly 630 having the motor disposed substantially within hub 631 allows further size economization, thus maximizing the available area on a table or desk for productive use. The use of front elevation plate 140 captures indirect lighting to enhance the overall appearance of space saving fan 100. Light dissemination plate 640 in conjunction with light sources 628 is capable of emitting a low level light for use on a desk. Additionally the use of front elevation plate 140 and/or light dissemination plate 640 serves to protect and isolate electrical components from direct contact by the user.

[0085] As can be appreciated the use of front elevation plate 140 and/or light dissemination plate 640 further distinguish space saving fans 100 and 600 from conventional desk top fans. Embodiments of space saving fans 100 and 600 have features that allow for a more functional, attractive and evocative presence on a desk or table top. The structural and feature innovation of space saving fan 100 and 600 also achieve the goal of re-invigorated interest on the part of the user and sale-ability on the part of the manufacturer and/or vendor.

[0086] Although the invention has been described with reference to exemplary embodiments, it is not limited thereto. Rather, the appended claims should be construed to include other variants and embodiments of the invention, which may be made by those skilled in the art without departing from the true spirit and scope of the present invention.

What is claimed:

1. A space saving fan with a front elevation plate comprising:
   a front elevation plate comprising;
   a front surface;
   a rear surface;
   an outer edge;
   an opening located within a central region of said front elevation plate, said opening connecting said front and rear surfaces;
   a width, height, and depth dimension, wherein said depth dimension is limited to less than about 15% of either the width dimension and/or the height dimension;
   an air generator disposed within said opening and connected to said front elevation plate, said air generator comprising:
   a housing;
   an electric motor;
   an impeller rotatably coupled to said motor, wherein rotation of said air impeller causes air to move from a rear of said front elevation plate to a front of said front elevation plate;
   an air generator width, height, and depth dimension, wherein said air generator depth dimension is limited to less than 50% of either the width dimension and/or the height dimension of said front elevation;
   wherein said limitation of said depth dimension of said front elevation plate and said limitation of said depth dimension of said air generator provide space saving characteristics for said space saving fan.

2. The space saving fan of claim 1, wherein said front elevation plate comprises a clear or semi-clear polymer and/or glass material and said front elevation plate is illuminated by ambient light.

3. The space saving fan of claim 2, wherein said front elevation plate further comprises colored tints and said illuminated front elevation plate includes a color intensification of said outer edge.

4. The space saving fan of claim 1, wherein one and/or both of said front and rear surfaces of said front elevation plate further comprises a surface treatment.

5. The space saving fan of claim 1, wherein said front elevation plate further comprises multiple sections.

6. The space saving fan of claim 1, wherein said front elevation plate supports said space saving fan relative to a support surface.

7. The space saving fan of claim 1, wherein said electric motor further comprises a direct current motor.

8. The space saving fan of claim 7, further comprising a power supply cord comprising:
   conductors having a first and a second end;
   a plug connected to said first end of said conductors and said motor electrically connected to said second end of said conductors; and
   a transformer disposed within said plug and/or between said plug and said motor, said transformer converting an alternating electric current from a power source to a direct electric current.
9. The space saving fan of claim 1, wherein said air impeller further comprise:
a center hub; and
multiple blades extending radially outward from said hub;
wherein said electric motor is disposed substantially within said hub.
10. The portable fan of claim 1, wherein said front elevation plate is a clear and/or semi-clear polymer and/or glass material.
11. The space saving fan of claim 10 further comprising:
a light source located proximate said opening in said front elevation plate;
wherein light generated by said light source is disseminated through said front elevation plate.
12. The portable fan of claim 11, wherein said light source comprises multiple light sources.
13. The portable fan of claim 11, wherein said light source comprises one or more light emitting diodes (LEDs).
14. The portable fan of claim 11, wherein said front elevation plate further comprises a pocket, wherein said light source is disposed within said pocket.
15. The portable fan of claim 14, wherein said pocket has a circular shape.
16. The portable fan of claim 11, further comprising a light shroud, wherein said light shroud impedes a user from directly seeing said light source.
17. The portable fan of claim 11, wherein said outer edge of said front elevation plate is illuminated by said light generated by said light source.
18. The portable fan of claim 17, wherein said polymer and/or glass material further comprises colored tints and said outer edge includes an illuminated color intensification.
19. The portable fan of claim 11, wherein one or both of said front and rear surfaces of said front elevation plate further comprises a reflective feature.
20. The portable fan of claim 11, wherein one or both of said front and rear surfaces of said front elevation plate further comprises a translucent material.
21. The portable fan of claim 11, wherein said front elevation plate further comprises multiple sections.
22. The portable fan of claim 11, further comprising a base connected to said front elevation plate, wherein said base supports said portable fan relative to a support surface.
23. The portable fan of claim 11, wherein said electric motor further comprises a direct current motor.
24. The portable fan of claim 23, further comprising a power supply cord comprising:
conductors having a first and a second end;
a plug connected to said first end of said conductors and said motor electrically connected to said second end of said conductors; and
a transformer disposed within said plug and/or between said plug and said motor, said transformer converting an alternating electric current from a power source to a direct electric current.
25. A space saving fan with a front elevation plate comprising:
a front elevation plate, said front elevation plate comprising:
a front surface;
a rear surface;
an outer edge;
an inner edge;
an opening defined by said inner edge, said opening located in a central region of said front elevation plate;
a depth of said front elevation plate defined by the distance between said front elevation plate and said rear surface;
a length and a height of said front elevation plate;
an air generator disposed within said opening in said central region of said front elevation plate, said air generator comprising:
a housing;
an air inlet in said housing on a rear of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
an air outlet in said housing on a front of said space saving fan;
34. The space saving fan of claim 29, further comprising pockets formed in said front elevation plate proximate said inner edge, wherein said one or more light sources are located in said pockets.

35. The space saving fan of claim 34, wherein said pockets are located in said front elevation plate at a distance from said inner edge such that light vectors radiated from said light source are radiated over an angular range greater than 180 degrees.

36. The space saving fan of claim 34, wherein said pockets are located in said front elevation plate at a distance from said inner edge such that light vectors radiated from said light source are radiated over an angular range greater than 270 degrees.

37. The space saving fan of claim 34, further comprising a light shroud extending over a portion of said front elevation plate proximate said inner edge and covering a surface of said front elevation plate proximate said one or more light sources, wherein said one or more light sources are blocked from direct view from in front of said space saving fan.

38. The space saving fan of claim 34, wherein said pockets comprise circular-shaped pockets.

39. The space saving fan of claim 27, further comprises one or more light sources located proximate said light entrance point(s), wherein primary light rays from said one or more light sources radiate along a first path through said front elevation plate.

40. The space saving fan of claim 39, wherein said first path is substantially radial.

41. The space saving fan of claim 39, further comprises secondary light rays, wherein said secondary light rays radiate along a second path that is at an angle with respect to said first light path.

42. The space saving fan of claim 41, further comprises a surface treatment that reflects all or a portion of said primary light rays to form said secondary light rays.

43. The space saving fan of claim 42, wherein said surface treatment comprises a reflective material on said rear surface, wherein said secondary light rays travel along said second light path from said rear surface toward said front surface.

44. The space saving fan of claim 41, wherein said second light path is substantially orthogonal to said rear surface.

* * * * *