March 25, 1969 M. KEMENCZKY 3,435,201

HEAT-ROTATED ILLUMINATED ORNAMENT

Filed March 27, 1967 Sheet 1 of 2

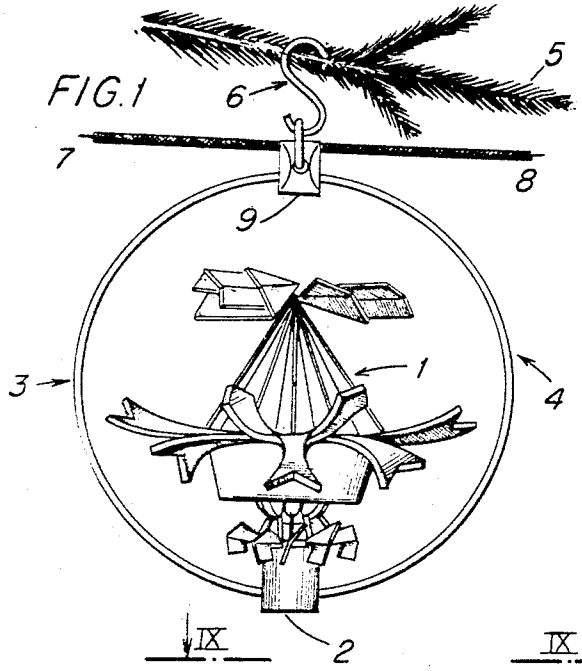


FIG. 1

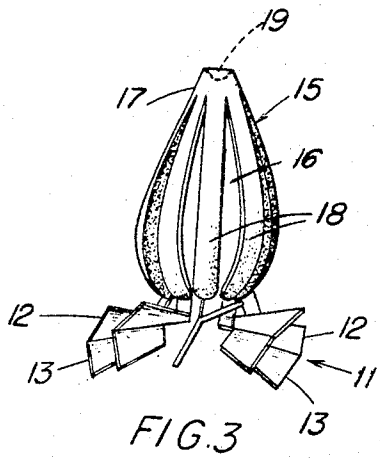


FIG. 3

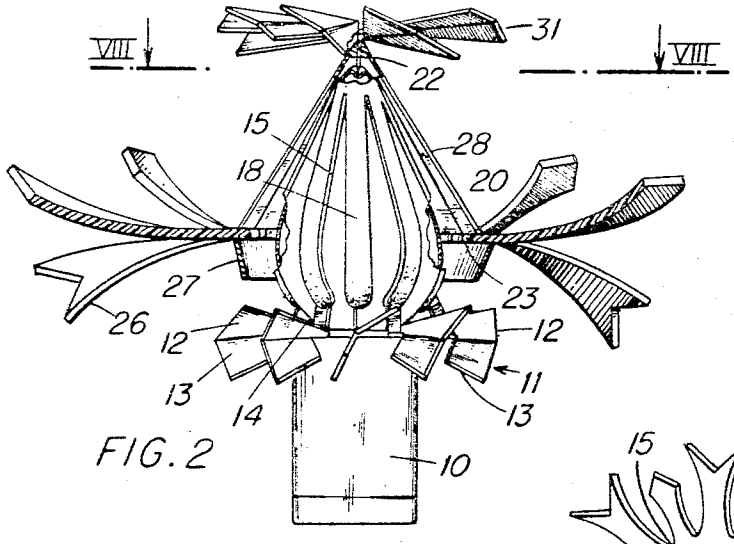


FIG. 2

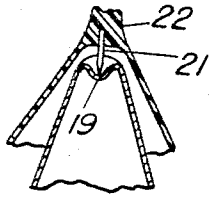


FIG. 4

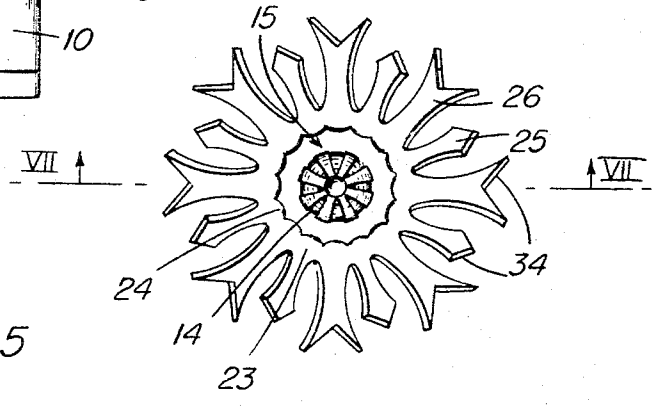


FIG. 5

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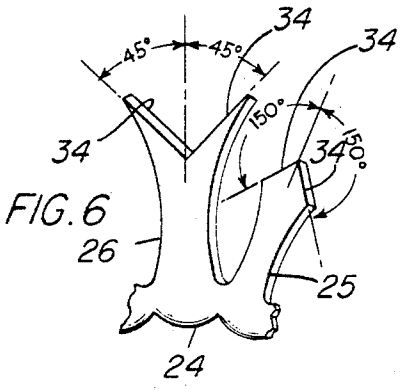


FIG. 6

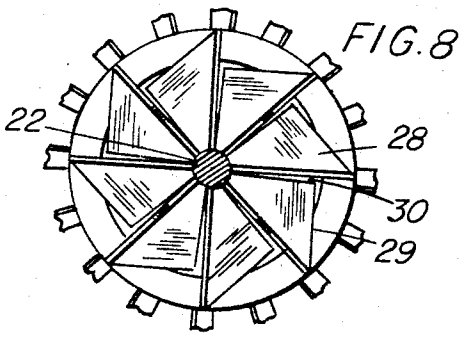


FIG. 8

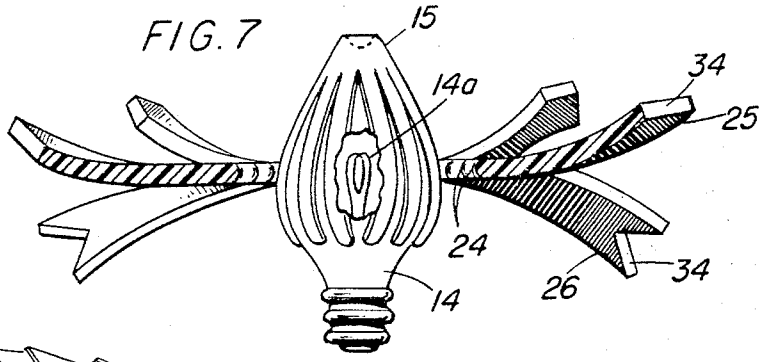


FIG. 7

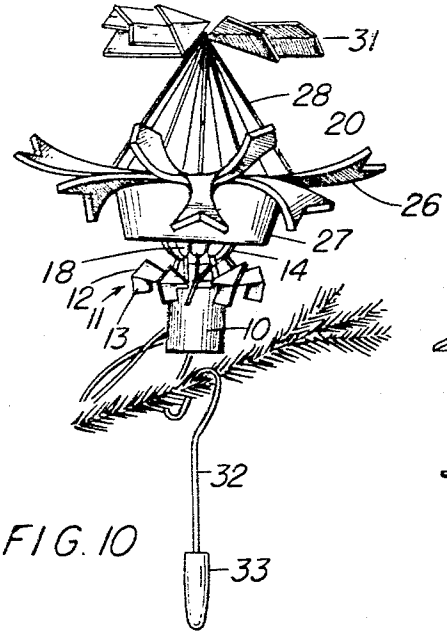


FIG. 10

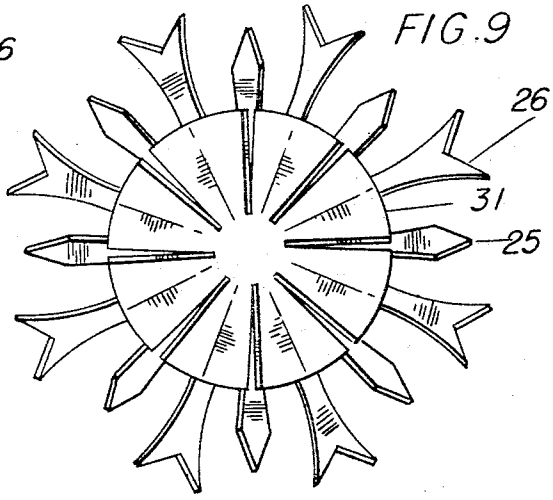


FIG. 9

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3,435,201

HEAT-ROTATED ILLUMINATED ORNAMENT

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Int. Cl. A47g 33/16
U.S. Cl. 240—10.1 10 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for producing sparkling point sources of brilliant light in the spherical zone surrounding a partially shielded central lamp element comprising a rotor assembly powered by convective currents generated by the lamp, the rotor including a plurality of optical channels discretely energized by the lamp element. A lamp shield having spaced opaque heat-conducting elements functions to significantly increase the temperature of the air mass immediately surrounding the lamp. As the heated air mass rises by convection, it is deflected by rotor vanes to impart rotation to the rotor assembly. As the rotor assembly rotates, the lamp shield has the further effect of transmitting discrete bundles of light rays to each of the plurality of optical channels, each channel comprising a lens element which rectifies incident light energy into parallel rays, a light-conducting member which is internally reflective throughout its length and an output element in the form of a planar surface or mirror. The planar surfaces are disposed in spherical zones surrounding the lamp element and transmit discrete bundles of light energy thereby simulating the effect of a chemical sparkler.

BACKGROUND OF THE INVENTION

Field of the invention

The present invention relates to improvements in heat-rotated, illuminated ornaments for such uses as decorating Christmas trees.

Description of the prior art

Previous ornaments of this kind are characterized by inefficiency in the use of the limited heat output of the associated low-wattage incandescent lamp. Such devices typically employ propeller means in the path of the heated air mass rising by convection from the incandescent lamp, but make no attempt to localize the heating effect of the lamp on the air mass immediately surrounding the lamp, to thereby increase the magnitude of the convective currents. By so localizing the heating effect, the present ornamental structure insures that the air mass impinging on the propeller is of high velocity whereby a significantly increased rotational momentum is achieved. In the prior art devices, high rotational momentum necessitated either the use of very large and extremely lightweight propellers with large blade area or an incandescent lamp of much higher wattage than the low-wattage lamp normally associated with such decorative schemes. The localized heating effect of the present invention permits the use of both a propeller of limited size and a low-wattage lamp to turn a comparatively heavy ornamental rotor.

The prior art devices are further characterized by their production of limited optical effects. Typically such devices provide only variations in color, shading or like display in an area adjacent the incandescent lamp by employing an ornamental rotor having multi-colored panels therein. Such display limitations are attributable primarily to the severe restrictions on the weight of the ornamental rotor capable of being driven by simple convection motors. In contrast, the subject invention, by

reason of the increased capacity of the convection motor with localized heating, overcomes these rotor weight restrictions and embodies a rotor which includes a multiple channel optical system extending outwardly from the incandescent lamp to create an aesthetically pleasing illusion imitative of a chemical sparkler. To this effect, the optical system embodied in the rotor assembly incorporates lens elements and internally reflective light-transmitting conductors with remote reflective surfaces, whereby a portion of the output of the incandescent lamp is presented to the viewer at a series of remote points which sparkle brilliantly as the device rotates.

A further advantage of the increased capacity of the convection motor with localized heating is that the ornamental rotor may support additional propellers which coact with secondary air currents at points remote from the incandescent lamp to impart additional rotation to the ornamental rotor.

The invention distinguishes further over presently available ornaments of this type by reducing the frictional forces present in the simple bearings normally employed in such ornaments. In this regard, the ornament employs a suspension system which is doubly articulated to insure that the ornament lies in a true gravitational plane, the weight of the ornament itself providing a pendulous force to bring about this condition.

Summary of the invention

It is a primary object of this invention to increase the magnitude of convective currents generated by low-wattage incandescent lamps to thereby provide improved rotation of an appended ornament.

It is a further object of this invention to provide a heat-rotated ornament embodying a rotor assembly which includes a multiple channel optical system.

It is an additional object of this invention to provide a heat-rotated ornament in which confined transmission of light output of an incandescent lamp produces an optical effect imitative of a chemical sparkler.

It is an additional object of the invention to provide a heat-rotated ornamental device which aligns itself with a true gravitational plane, thereby permitting the use of a simple bearing member.

A further object of the invention is to provide secondary rotational power for a heat-rotated ornamental device by the use of additional propeller means cooperating with secondary air currents existing at points remote from the ornament lamp.

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of a preferred embodiment of the invention which is illustrated in the accompanying drawings wherein like numerals identify similar parts throughout.

Brief description of the drawings

FIGURE 1 is an elevational view of the ornament of the invention, showing the same suspended from a Christmas tree branch.

FIGURE 2 is a fragmentary elevational view of the ornament partly broken away to show detail.

FIGURE 3 is an elevational view of the light shield of the invention.

FIGURE 4 is a fragmentary enlarged sectional view of the bearing surfaces of the light shield and the rotor assembly.

FIGURE 5 is a plan view of the disc of the rotor assembly showing its position in relation to the lamp element.

FIGURE 6 is a fragmentary enlarged view of a portion of the disc.

FIGURE 7 is a fragmentary elevational view, as seen from the plane VII—VII of FIGURE 5.

FIGURE 8 is a fragmentary horizontal view as seen from the plane VIII—VIII of FIGURE 2.

FIGURE 9 is a plan view as seen from the plane IX—IX of FIGURE 2.

FIGURE 10 is an elevational view of an alternative form of the embodiment.

Description of the preferred embodiments

Referring to FIGURE 1, ornament 1 is supported by clamp 2 of segmented O-ring 3, 4 which is attached to tree branch 5 by hook element 6. The ornament is illuminated by power derived from insulated electrical conductors 7 and 8 which are connected through collar 9 to the insulated conductive O-ring segments 3 and 4 respectively. The conductors 7 and 8 may be connected in either a series or parallel external power circuit. Segments 3 and 4 are in turn connected within clamp 2 to the ornament lamp socket. This preferred method of constructing power to the ornament through its support members insures that the ornament will be suspended from the tree branch in an essentially vertical position which, as will be hereinafter discussed in detail, permits components of the ornament to rotate freely despite the use of a simple bearing. Alternatively, the ornament may be illuminated by conventional Christmas tree lamp wiring in which case power is applied to the ornament lamp through conventional electrical conductors leading into the lamp socket. In this case a pendulous device would be employed to maintain the ornament in the vertical as will be discussed in connection with FIGURE 10.

As may be seen in FIGURES 2 and 3, the subject ornament includes a base 10 adapted to support an incandescent lamp 14. Lamp 14 is seated in base 10 either with its associated lamp socket or in a separate socket integral with base 10. A lamp shield 15 engages lamp 14 and is supported thereby. Shield 15 in turn supports a stator assembly 11 at the lower portion thereof, this assembly comprising a series of blade sections 12 and 13 angularly disposed with respect to base 10 so as to impart a prerotation to air flowing upwardly thereover. As an alternative to this preferred structure wherein stator assembly 11 is integral with shield 15, the assembly may be fixed to the upper portion of base 10. Referring to FIGURE 3, shield 15 further comprises spaced resilient fingers 18 extending from apex 17 to define slits 16 between adjacent fingers. Apex 17 embodies a depression 19 in the top surface thereof which constitutes a bearing surface for rotor 20. In the detailed view of FIGURE 4 it may be seen that depression 19 provides pinpoint support for metallic pin 21 of rotor hub 22. If the lamp 14 is dimpled at the top surface thereof, the shield apex 15 is formed with a hole for passage of pin 19 rather than the depression 19, and the lamp dimple acts as the bearing surface. As a further alternative, pin 21 may be fixedly supported by shield 15 and cooperate with a tubular bearing surface within the rotor hub 22.

Rotor 20 comprises a translucent disc 23 (FIGURE 5) having a central aperture which encircles lamp 14. In FIGURES 5 and 6 it may be seen that the aperture is defined by a series of adjacent lens elements 24 formed integrally with disc 23. Disc 23 further comprises a series of extending branches which are alternately arrow-tipped as at 25 and fork-tipped as at 26. It is preferred that the brances extend upwardly and downwardly from the plane of disc 23 as in FIGURE 7 such that the ends of the branches are disposed in a random three-dimensional pattern about lamp 14. Rotor 20 encloses the lower portion of lamp 14 within a truncated inverted cone 27 extending downward from disc 23. The upper portion of rotor 20 comprises a series of triangular vanes 28, the bases 29 (FIGURE 8) of which are connected to disc 23 at a uniform acute angle so as to define air passages 30 between adjacent vanes. At their uppermost points, the vanes are joined to form hub 22, which supports a plurality of rotor blades 31 which are disposed at a uniform angle with respect to the plane of disc 23. As an alternative to the tilted individual vanes, the upper portion of rotor 20 may comprise a slotted cone, the slots defining air passages approximating the effect of the passages 30.

Rotation of rotor 20 is induced by convective currents generated by lamp 14 in the surrounding air and is enhanced by the action of certain of the above structural elements of the ornament on this air. To begin with, the shield 15 is made of a metal of good heat conducting quality and the inner surfaces of the fingers 18 thereof are coated with a radiation-absorbing material. As power is applied to the lamp, the fingers disposed adjacent the lamp receive a significant portion of the heat output thereof by absorption of radiation. The fingers are reflective on the reverse side such that the absorbed energy is not radiated but rather transmitted only by conduction to the air immediately surrounding the lamp. By the use of this heat transmission barrier much of the radiant energy of the lamp is retained and converted and a highly efficient localized heating of the surrounding air mass is effected giving rise to convective currents of much higher magnitude than would result if the lamp were permitted to radiate without such restriction. As the air mass rises by convection, it impinges on the inner surfaces of vanes 28. The air mass is deflected by these reaction surfaces through air passages 30 producing a torque on the rotor 20. This torque is further increased by rotor blades 31 which are disposed angularly with respect to this deflected air mass so as to increase the momentum of rotation transmitted to the body.

By virtue of the high magnitude convective currents, a normally stagnant secondary air mass below and surrounding base 10 is drawn upwardly and over the stator blade sections 12 and 13 which deflect it both into and through rotor 20 and also over the exterior thereof such that it impinges upon the branches 25 and 26 which are twisted as shown in FIGURE 7 to provide an additional propeller for rotor 20. This effect is further enhanced by the conductive heating of stator blade sections 12 and 13 by virtue of their connection with fingers 18 of shield 15. As the stator grows warm, additional convective currents are generated. It may thus be seen that numerous factors are active is providing increased rotational velocity for a comparatively heavy rotor including the improved heating provided by shield 15 and three distinct propeller means at least one of which cooperates with a fixed set of heated stator blades.

It is important for efficient operation of this improved structure for causing rotation of the ornament that frictional forces impeding rotation be minimized. To this effect, the ornament should hang as closely to true vertical as possible whereby a pinpoint contact occurs between pin 21 and shield depression 19 permitting the rotor to be symmetrically disposed about lamp 14. This condition is insured by the use of segmented O-ring 3, 4 and collar 9 which provide a doubly articulated suspension. Hook 6 may assume any position as influenced by the geometry of the tree and pressures of branch needles. Collar 9 is less subject to such influence and will seek the vertical under the influence of the weight of the ornament and O-ring. Should the gravitational plane still elude the assembly, relative rotation may be provided between the collar and the O-ring.

Alternatively, the ornament may be caused to assume the vertical by the arrangement of FIGURE 10 wherein a deformable wire 32 carrying a decorative pendulum 33 is secured to ornament base 10. The wire is deformed about a branch to secure the assembly to the tree. The remaining portions of the wire are adjusted such that the pendulum and ornament are in a vertical line of sight. The ornament will thus reside in the gravitational plane

and any departures therefrom will be readily compensated by reaction of the pendulum.

The ornament embodies an optical system which operates to produce a sparkling effect imitative of that created by a chemical sparkler, i.e. a plurality of intermittent point sources of brilliant light are created in a spherical zone surrounding a glowing center.

In bringing about this result, the optical system transforms the conventional commercial lamp filament into an approximate line source of light and by virtue of relative rotation of system elements transmits discrete bundles of light rays emanating from this source to a plurality of light channels. Each such channel employs lens means which render the discrete bundle of light rays issuing from the line source parallel in one plane and divergent in a plane perpendicular thereto. The light channels confine these parallel-divergent rays while conducting them to an output element in the form of a planar surface or mirror which concentrates the brilliance of the discrete bundle of energy at a remote point. The output elements are disposed in a random three-dimensional pattern about the lamp, so as to simulate the appearance of the chemical sparkler. A particular pattern wherein the output elements reside in two concentric spherical zones about the lamp results from the manner of twisting the arms **25** and **26** discussed above in connection with FIGURE 7.

The ideal light source for practice of the subject invention is a single line filament which is coincident with the axis of rotation of disc **23**. A light source of this type insures that the light rays arriving at lens elements **24** are parallel. The standard incandescent lamp does not meet this requirement, but rather generally has one or several loops of filament **14***a* increasing the area of emission and rendering the output light widely divergent. To overcome this limitation, shield **15**, which as described previously operates as an improved heating element for the air mass surrounding lamp **14**, functions also to compensate the improper form of the filament to permit the system to operate with standard light sources. In particular, the slits **16** between adjacent fingers **18** of the shield act to transform the multiple loop filament into essentially a line source of light. By thus simulating the behavior of a line source of light, the multiple loop filament provides light beams which are not widely divergent. A further feature of the system is that all surfaces of the lamp adjacent the slits **16** other than those where the beams enter directly into the branches may be covered with light reducing material so as to further increase the comparative intensity of the lamp output impinging on lenses **24**.

Since the disc **23** rotates about the light source and shield, lenses **24** are alternatively exposed to a discrete bundle of light rays emanating from the lamp and subsequently to a short period of darkness when a finger **18** is interposed between the lens and the lamp. It is this effective chopping of the lamp output which generates the discrete bundle of light rays.

The optical plane of symmetry of the lenses **24** lies in the geometric plane of symmetry of disc **23**, i.e. the lenses are optically centered at the inner ends of the associated branches **25** and **26**. Referring to FIGURE 6, the lenses render incident light rays parallel in the plane of the drawing and divergent in the plane perpendicular to that of the drawing. The disc **23** is molded from a clear transparent plastic such as Lucite, plexiglass or similar material and can be either colorless or tinted according to aesthetic taste. All surfaces of the disc **23** are flat and polished and each of the arrow-tipped and forked-tipped branches **25** and **26** constitute light transmitting channels which are internally reflective so as to totally confine the light energy issuing from the lens along the length of the branches. In spite of the bending of the branches to define the two concentric spherical zones at which the sparkling effect occurs, the light rays are completely reflected internally, and are led along the branch to the tip thereof provided that the radius of bending of the branch is sufficiently great in proportion to its thickness. At the tips of each branch are output elements in the form of flat, polished planar surfaces **34** which act efficiently as mirrors. The planar surfaces **34** are shown in the FIGURE 6 at a 45° angle to the radius of the disc in the case of the forked-tipped branches **26** and at approximately 30° to the radius of the disc for the arrow-tipped branches **25**. The light beams emerge only at these planar surfaces and the particular illuminated disc shown therefore produces thirty-two concentrated beams of parallel light scanning the surroundings as the disc rotates. As the light incident upon the lens **24** associated with each branch is periodic in nature and dependent upon the rotational velocity of the rotor, the relative number of fingers **18** and lenses **24** and the relative widths of fingers **18** and slits **16**, the tips will appear brilliant only momentarily as the parallel beams issue therefrom.

The upper portion of rotor **20** comprising vanes **28** is also of a translucent plastic from whose polished inner surfaces light will be reflected through the passages **30** to provide a secondary sparkling effect. The conical portion **27** of the rotor **20** is of a colored translucent plastic and provides a glowing center for the display.

While the invention has been shown in the preferred embodiment in which disc **23** comprises a plurality of individual lenses **24**, the lens means employed may alternatively be continuous in nature, i.e., the disc **23** may have merely a circular aperture. In this case, the rectification of incident energy does not occur and there is a slight reduction in the intensity of the sparkling effect.

While the invention has been particularly shown and described with reference to a preferred embodiment thereof, it will be understood by those skilled in the art that various changes in form and detail may be made without departing from the spirit or scope of the invention.

What is claimed is:

1. An ornament for creating sparking point sources of light about a lamp comprising:

(a) a shield enclosing said lamp;

(b) a rotor assembly supported by said shield including a disc having:

(1) a central aperture encircling a portion of said lamp and defined by a lens means;

(2) a periphery of a plurality of separate light-emitting planar surfaces disposed in a random three-dimensional pattern about said lamp;

(3) a plurality of light conductors interconnecting said lens means and said planar surfaces; said shield having opaque sections and translucent sections therein, said translucent sections conducting light from said lamp to said lens means as said rotor assembly is rotated.

2. The ornament as claimed in claim **1** wherein said light conductors are internally reflective throughout their length.

3. The ornament as claimed in claim **1** wherein said lens comprises a plurality of lenses, each said lens communicating with a corresponding one of said plurality of light conductors.

4. The ornament as claimed in claim **1** wherein said rotor assembly includes a plurality of vanes extending upwardly convergently from said disc, adjacent vanes defining therebetween air passages, said vanes providing first reaction surfaces upon which heated air rising from said lamp impinges and is deflected through said air passages to impart rotational torque to said rotor.

5. The ornament as claimed in claim **4** wherein the opaque sections of said shield member comprise heat-conductive fingers engaging said lamp, said fingers embodying at the outer surface thereof a radiant heat-transmission barrier.

6. The ornament as claimed in claim 4 wherein said rotor assembly includes further a propeller assembly supported by said vanes, said propeller assembly having angled blade members providing second reaction surfaces upon which heated air rising from said lamp impinges and is deflected to impart rotational torque to said rotor.

7. The ornament as claimed in claim 4 wherein a stator assembly is supported by said shield through a heat-conductive connection therewith, said stator assembly comprising a plurality of blades which provide third reaction surfaces to deflect a secondary air mass rising from below said stator assembly into and around said rotor.

8. The ornament as claimed in claim 7 wherein said light conductors are twisted so as to provide fourth reaction surfaces upon which said secondary air mass impinges to impart rotational torque to said rotor assembly.

9. The ornament as claimed in claim 4 comprising

further a base member adapted to receive said lamp, and support means connected to said base member articulated to maintain said ornament in the gravitational plane.

10. The ornament as claimed in claim 9 wherein said support means comprises a pair of arcuate segments affixed at one end thereof to said base member and at the other end thereof being rotatably supported in a collar which is in turn rotatably supported by a hook element.

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