Feb. 21, 1967 W. M. SWARTZ 3,304,640

HEAT MOTOR AND DUST SHIELD THEREFOR

Filed Dec. 6, 1963

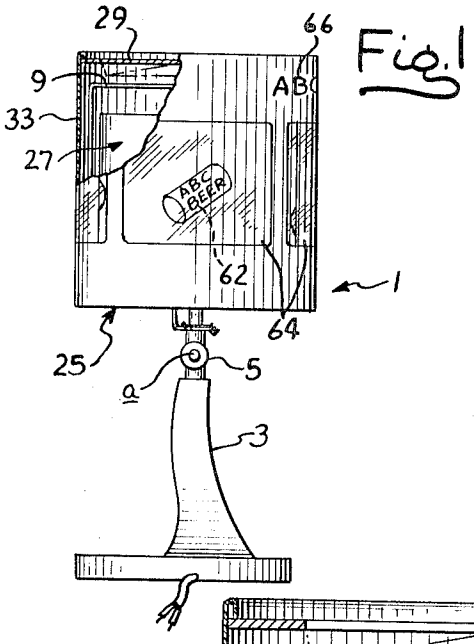


Fig. 1

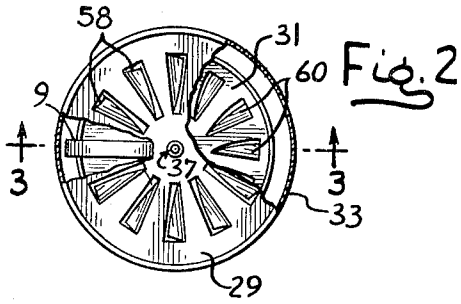


Fig. 2

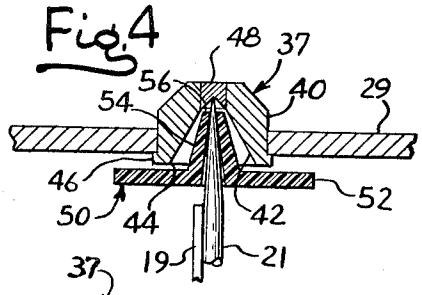


Fig. 4

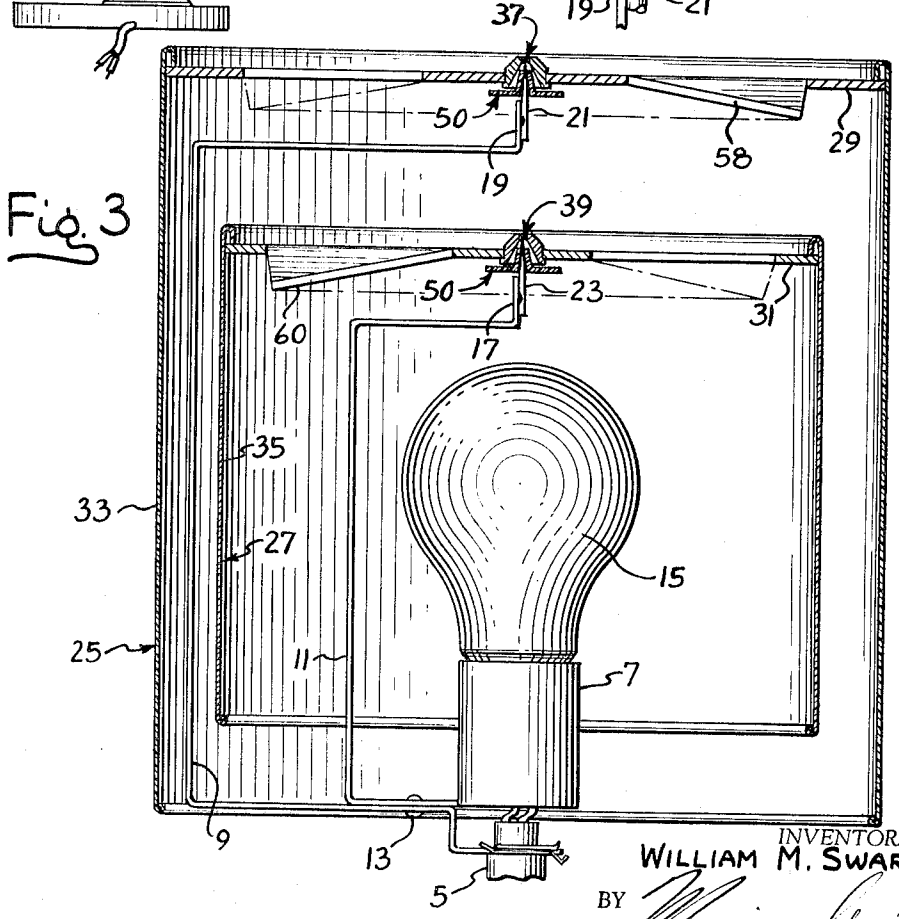


Fig. 3

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HEAT MOTOR AND DUST SHIELD THEREFOR

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This invention relates to improvements in motors of the type driven by convention currents of air rising from a heat source.

A heat motor of the type with which the present invention is concerned generally comprises an impeller that includes a horizontal wall having a series of blades or vanes and a tubular side wall depending from the horizontal wall. The horizontal wall has a central, downwardly opening cup-shaped thrust bearing that receives an upstanding needle-pointed pivot from which the impeller is suspended and about which the impeller rotates. The needle-pointed pivot has very little friction so that the impeller is capable of relatively free rotation. A heat source, which may be a conventional incandescent light bulb, induces an upward flow of air that impinges upon the vanes to rotate the impeller.

Heat motors of the foregoing type are used in advertising displays in which event the depending side wall may carry advertising matter that is illuminated by the bulb. Accordingly, in most applications it is desirable that the heat motors be capable of long periods of continuous operation without attention. I have found, however, that the rising air currents induced by the heat source, carry particles of dust and foreign matter, especially fibrous or paper-like matter, which tend to collect in the bearing at the pivot point. These collected foreign particles tend to increase the friction at the pivot sufficiently to cause the impeller to decrease its speed of rotation and, in a relatively short period of time, to cease rotating altogether. For this reason, heat motors of the foregoing type have not been considered sufficiently reliable for advertising displays.

It is, therefore, an object of the present invention to provide a heat motor of the type stated in which a shield is mounted across the opening in the bearing housing to reduce or susbtantially prevent the collection in the bearing at the pivot point of foreign particles which are carried by the induced air currents that are created by the heat source, thereby to increase significantly the operating life of the motor.

It is a further object of the present invention to provide a heat motor of the type stated in which the shield is so constructed and is of a plastic material such that when assembled with the needle-pointed pivot, minute particles of the plastic rub off onto the needle point and serve as a lubricant. Moreover, the lubricating particles are of such character that particles of dirt that might find their way into the bearing will not adhere to the pivot point.

It is in additional object of the present invention to provide a heat motor of the type stated in which the dust shield has a shoulder that is just below the pivot point. This shoulder serves to retain liquid lubricant at the pivot point should a liquid lubricant be used. By using liquid lubricants of varying viscosity, different speeds of rotation of the impeller may be obtained.

It is also an object of the present invention to provide an advertising display embodying the heat motor and dust shield of the present invention. The advertising display may have one or more impellers with one impeller telescoped within the other and with the vanes on the respective impellers being such that the impellers rotate in opposite directions.

The attainment of the above and further objects of the present invention will be apparent from the following specification taken in conjunction with the accompanying drawing forming a part thereof.

In the drawing:

FIG. 1 is a side elevational view, partially broken away and in section, of an advertising display that embodies the heat motor of the present invention;

FIG. 2 is a top plan view, partially broken away and in section, of a display of FIG. 1;

FIG. 3 is a fragmentary sectional view, on an enlarged scale, taken along line 3—3 of FIG. 2; and

FIG. 4 is a view of a portion of FIG. 3 and showing, on a further enlarged scale, the bearing, needle-pointed pivot, and dust shield of the present invention.

Referring now in more detail to the drawing, 1 designates a heat motor which, in the embodiment of the invention illustrated, is an advertising display. The display comprises a base or stand 3 the upper end of which has a swivel joint 5 for supporting a lamp socket 7 and a bracket 9. A second bracket 11 may be secured to the lamp socket in any suitable manner and to the bracket 11 by a rivet 13. The swivel joint is conventional and enables the lamp socket 7 and brackets 9, 11 to swing about an axis *a* relative to the base 3 and be locked in place so that they may assume various positions relative to the base 3. This permits the display to be used by placing the base 3 on a table or mounting it on a wall. A conventional incandescent bulb 15 is threaded into the upper end of the lamp socket 7.

The brackets 9, 11 are preferably formed of narrow strips of sheet metal bent to the general U-shape shown and terminate in flanges 17, 19. Welded or otherwise permanently secured to the flanges 17, 19 are upstanding needles 21, 23 which are one above the other and approximately coaxial.

A pair of coaxial impellers 25, 27 one telescoped within the other, are rotatably suspended from the points of the needles 21, 23. The impellers each have transverse or top walls 29, 31 and tubular depending side walls 33, 35. Centrally of each top wall 29 is a thrust bearing 37, 39. The thrust bearings are identical and one of them 37 is shown on an enlarged scale in FIG. 4.

Each thrust bearing comprises a cup-shaped bearing housing 40 having a generally conical interior wall 42 that terminates in a lower end 44 that is open for receiving the associated needle 21, 23. The bearing housing 40 projects through the transverse wall 29, 31 of the associated impeller and the lower end of the housing 40 may have a radial retaining flange 46, that abuts the lower surface of the transverse wall. Any suitable adhesive may be used to bond the exterior of the housing 40 to the transverse wall. The upper end of the housing 40 is closed by a hard bearing material 48, such as sapphire, which serves as a self-aligning bearing surface for the point of the needle.

Frictionally fitted over each needle 21, 23 is a dust shield or deflector 50 that may be fabricated of suitable material, such as polypropylene preferably of a dark or black color. The deflector 50 comprises an annular disc portion 52 that extends across the lower end 44 of the bearing housing, the disc portion 52 being closely spaced from the housing and radially larger than the open end 44 to cover same completely. The deflector 50 also has an axial sleeve 54 that surrounds and grips the needle frictionally and which projects into the bearing housing 40 terminating in a shoulder 56 that is spaced slightly below the point of the needle but clearing the adjacent internal surface 42 of the housing and the bearing material 48.

The impeller top walls 29, 31 have vanes 58, 60 that are circumferentially spaced and are formed by being

struck axially from the adjacent surfaces of the top walls **29, 31**. When air flows gently axially of and through the top walls **58, 60**, the air will impinge upon the vanes **58, 60**, causing the impellers **25, 27** to rotate. Moreover, the respective sets of vanes **58, 60** are pitched in opposite directions so that upon flow of air axially through both of the impellers **25, 27**, they will rotate in opposite directions.

The side wall **35** of the inner impeller **27** may have any suitable legible indicia **62** appropriate to the product or service being advertised. The side wall **33** of the outer impeller **45** may have one or more transparent windows **64** through which the indicia **62** is visible when the bulb **15** is illuminated. Moreover, the outer surface of the side wall **33** may also have suitable indicia **66**, if desired.

Prior to mounting the impellers **25, 27** onto the needle points, the deflectors **50** are assembled with the needles **21, 23** by pushing the sleeve **50** over the needle points. When this is done, small particles of the polypropylene rub off onto the needle point. These may be very minute both in size and quantity, but they nevertheless serve as a lubricant for the pivot point. Moreover, dust and dirt does not tend to adhere to the polypropylene particles. If desired, a liquid lubricant, such as a conventional silicone oil, may be added to the needle point, in which event the shoulder **54** will assist in retaining the oil at the needle point as by capillary action.

When the bulb **15** is illuminated, it will create sufficient heat to induce a flow of air upwardly through the tubular impellers **25, 27** and through the top walls **29, 31**, thereof, and the induced flow of air will strike the vanes **58, 60** causing the impellers to rotate in opposite directions. Dust, dirt, or other foreign particles carried upwardly by the induced flow of air will not tend to collect in either bearing housing **40** but will be deflected therefrom by the deflectors or shields **50** that are disposed across the lower open ends **44** of the bearing housings **40**.

While I have referred to the use of an incandescent bulb for inducing a flow of air through the impellers, other means for inducing air flow may be utilized in appropriate situations. The friction at the needle points is so low that the impellers may, in some locations be caused to rotate as a result of convection currents created by heating or air conditioning systems, air drafts that may be present adjacent to windows, or the like.

In compliance with the requirements of the patent statutes I have herein shown and described a preferred embodiment of the invention. It is, however, to be understood that the invention is not limited to the precise construction herein shown, the same being merely illustrative of the principles of the invention. What is considered new and sought to be secured by Letters Patent is:

1. An air driven motor comprising an impeller rotatable upon axial flow of air therethrough, thrust-bearing means rotatably supporting the impeller and from which the impeller is suspended, said thrust-bearing means including a member terminating in a needle point, means for inducing a flow of air past the thrust-bearing means and axially through the impeller, and means adjacent to the thrust-bearing means for shielding the needle-pointed member from particles of foreign matter carried by the induced flow of air, said shielding means comprising an element that is pre-formed of a solid material having lubricating properties and in which particles of the material will rub off onto the needle point when the element is assembled with the needle-pointed member upon projecting the needle point therethrough so as to provide a lubricant for said thrust-bearing means.

2. An air driven motor comprising an impeller having a series of vanes, thrust-bearing means rotatably supporting the impeller; said thrust-bearing means including a bearing housing open at one axial end and closed at its other axial end, a bearing surface in the housing remote from the open end of the housing, and a member projecting into the open end of the housing and terminating in a needle point that engages said bearing surface, said impeller being rotatable about a vertical axis that passes through the needle point upon axial flow of air toward said open end of the housing and the impeller vanes, a shield disposed across said open end of the housing for deflecting from said open end foreign particles carried by the flow of air that rotates the impeller, and an axial sleeve integral with and extending from said shield toward said needle point and into the bearing housing, said sleeve embracing and frictionally gripping said member over a portion of its length and thereby maintain the disc-like element secured in a substantial fixed position on said member, said open end of the bearing housing being downwardly presented, the closed end of the bearing housing being upwardly presented, and the bearing surface being adjacent to said closed end of the housing, the shield being a plastic element frictionally held onto said member with the needle-pointed end of the member projecting through the shield, the shield being of such size as to extend radially beyond the perimeter of said open end of the housing, the plastic having lubricating properties and being of such character that minute particles thereof rub off onto the needle point when the member is assembled with the shield upon projecting the needle point through the shield so as to provide a lubricant for said thrust-bearing means.

3. An air driven motor comprising an impeller having a transverse wall and a depending side wall, said transverse wall having a series of vanes thereon of such configuration as to cause the impeller to rotate upon flow of air against the vanes and through the transverse wall, a cup-shaped thrust bearing housing mounted centrally of the transverse wall and being closed at its upper axial end and open at its lower axial end, a bearing surface in said housing adjacent to said closed end and presented downwardly toward said open end, an upstanding member projecting into the bearing housing through said open end and terminating in a point that engages the bearing surface and constitutes a pivot from which the impeller is suspended and about which the impeller may rotate, a heat source below the transverse wall and surrounded by said depending side wall for inducing an upward flow of air past the bearing housing and against the vanes and through said transverse wall, and a shield mounted on said member and disposed across and surrounding the periphery of said open end of the housing for deflecting away therefrom foreign particles carried by the upward flow of air, said shield being a plastic element having a hole for frictionally receiving the member, the pointed end of the member projecting through the shield, the plastic having lubricating properties and being of such character that minute particles thereof rub off onto the point when the latter is inserted into the hole during assembly of the member and shield so as to provide a lubricant for said thrust-bearing means.

4. An air-driven motor comprising an impeller having a series of vanes, thrust-bearing means rotatably supporting the impeller; said thrust-bearing means including a bearing housing open at its lower axial end and closed at its upper axial end, a bearing surface in the housing adjacent to said closed end, and a member projecting into the open end of the housing and terminating in a needle-point that engages said bearing surface; said impeller being rotatable about a vertical axis that passes through the needle point upon axial flow of air toward said open end of the housing and the impeller vanes, and a shield disposed across said open end of the housing for deflecting from said open end foreign

particles carried by the flow of air that rotates the impeller, said shield comprising a plastic element frictionally held onto said member with the needle-pointed end of the member projecting through the shield, the shield being of such size as to extend radially beyond the perimeter of said open end of the housing, the plastic having lubricating properties and being of such character that minute particles thereof rub off onto the needle point when the member is assembled with the shield upon projecting the needle point through the shield so as to provide a lubricant for said thrust-bearing means.

References Cited by the Examiner

UNITED STATES PATENTS

1,865,758	7/1932	Horton	40—106.54
1,935,557	11/1933	Haag	40—106.54
2,253,869	8/1941	Robin	40—106.54
3,056,019	9/1962	Apatoff	240—10.1

FOREIGN PATENTS

324,761	2/1930	Great Britain.

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