

Implementation of Bladeless Fan

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Abstract— This paper is about design and implementation of a bladeless Fan for safety reasons and noise minimization in a table fan. The fan blades are hidden and the wind is channeled out in one direction and well distributed air as a result of the fan rotation. The fan was locally fabricated using PVC pipe, wood and hard paper. Bladeless fan is the newest trend in the fan industry. It is very powerful as it multiplies the air flow coming out, thus, offering much better cooling. A bladeless fan has several benefits over conventional fans. The fans work on a simple mechanism – to suck in air and push it out. Hence, they do not consume a large amount of electricity and are energy efficient.

Keywords- Bladeless, Fan, motor, fabrication, cooling, Monitoring

I. INTRODUCTION

A fan is an electricity driven machine used to produce flow inside a fluid, usually a gas such as air. A fan consists of a rotating arrangement of vanes or blades that act on the air. The rotating assembly of blades and hub is known as an *impeller, rotor, or runner*. Usually, it's contained inside some form of housing or case. This could direct the flow of air or increase safety by preventing objects from contacting the fan blades. Fans are driven by electric motors, but other sources like hydraulic motors, hand cranks, internal combustion engines, and solar power may also be used.

Think of a reverse vacuum cleaner that produces airflow of up to 55mph. For most people who've seen the Dyson Air Multiplier, the first thought that popped into their heads was "That's really cool", the second was "How does that air multiplier work?" Given the ultra-modern design of this device, it is easy to be surprised about the method that produces this "fan" function.

The Dyson Air Multiplier is a bladeless fan that gives a sleek flow of air, very like that of a continuing wind breeze. It has a futuristic look very much different from traditional fans and as we found out, it works much differently as well.

Although it's referred to as a "bladeless" fan, the Dyson Air multiplier does indeed have blades within; they are simply hidden within the pedestal stand. This is the section of the fan that draws in up to 5.28 gallons of air per second, as much as a vacuum cleaner!

In addition to the blades within the pedestal stand, the air multiplier additionally makes use of a brushless motor, that rotates the nine asymmetrically-aligned blades. This provides for precise control of the speed of the fan, whereas staying comparatively quiet compared to brushed motors. The

pedestal motor adds extra push to the fast flowing air and shoots it up into the ring portion of the fan.



Fig. 1.0: Table and Fan and Bladeless Fan

Characteristics of Bladeless Fan

- It has an elegant design.
- Bladeless fan throws 5.8 gallons air/sec.
- It can rotate upto ninety degrees.
- It has got LED on/off system for use in the night.
- It is light weight.
- Air flow control for adjusting air flow.

Benefits of Using Bladeless Fan

- It is noise free.
- It is affordable.
- It is safe due to absence of blades.
- One can set its off timing in advance so as to switch it off latter on its own.
- Constant uniform flow of air for a better experience.

Advantages of a Bladeless Fan over Standard Fans

Bladeless fan is the newest trend in the fan industry. It is very powerful as it multiplies the air flow coming out, thus, offering much better cooling. A bladeless fan has many advantages over conventional fans.

- Since it is devoid of external blades, it is safer than a conventional ceiling or table fan as there is no fear of cutting yourself with it.
- The hollow tube of the fan makes it easier to clean. While the blades of a conventional fan collect dust easily, it is not the case with a bladeless fan.

- It can be controlled by a remote. So, you don't need to adjust the speed of the fan manually every time.
- It is significantly lighter than a conventional fan. Thus, it can be moved from one place to another very easily.
- The blades of a conventional fan first chop the air before it reaches you, thus, causing buffeting. There is no issue of buffeting with a bladeless fan since it has no blades.
- It is appealing to look at. Sleek and elegant, these fans have a unique design that can blend in very well with the furniture in your room.

II. METHODOLOGY

We had constructed the bladeless fan by using simple things which we can find in anyone's home. We had used plastic bucket to make the circular tube, PVC Sanitary pipe for pedestal, metal plate from which the fan is cut, a DC motor and a DC driving source. The fan rotates inside the pedestal and sucks air from the surroundings through minute holes provided on the pedestal surface. This air is circulated to the circular tube from the pedestal. Air circulated in the circular tube then gets deflected by the water pipe provided on the back peripheral side of the circular tube. The deflected air emerges out from the slits provided at the inner peripheral sides.

A. The Mechanics of the Air Multiplier

Calling the Dyson Air Multiplier a fan with no blades is perhaps a touch misleading. There are blades in the fan -- you just can't see them because they're hidden in the pedestal. A motor rotates nine asymmetrically aligned blades to pull air into the device. According to Dyson, these blades can pull in up to 5.28 gallons (about 20 liters) of air per second.

The air flows through a channel in the pedestal up to the tube, which is hollow. The interior of the tube acts like a ramp. Air flows along the ramp, which curves around and ends in slits in the back of the fan. Then, the air flows along the surface of the inside of the tube and out toward the front of the fan. But how does the fan multiply the amount of air coming into the pedestal of the device?

B. The Rotation Mechanism

The motor employed in the implementation of this journal is a motor that is found in microwave oven Which basically it's a high torque motor, moves very slowly (approx. 2.5 revolutions per minute), and can rotate counter-clockwise (CCW) or clockwise (CW). This mode is also known as "free". Since the motor is free to turn in either direction when power is applied. The direction was influenced by applying a relay to make and break power at interval causing the fan to swing or rotate at an angle of 180°.

Table 1.0: Motor Technical data

(Rated voltage)	(V)	AC12V-240V
(Rated frequency)	(Hz)	50 Hz/60 Hz
(Input power)	(W)	4W
(Insulation class)	(class)	A.E.B.F.H.N
rotation speed	(r/min)	0.8-100r/Min
certifications		UL1TUMCEEIWD

Remarks: motor output shaft can be custom-made.
4. outline drawing:

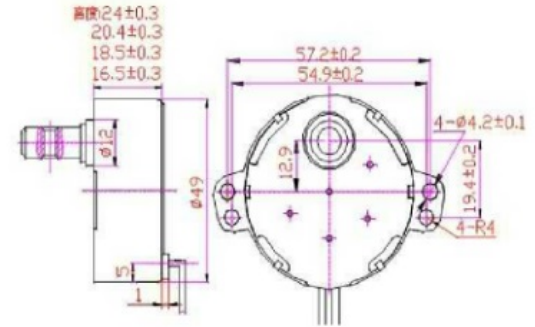


Fig.2.0: Outline drawing of motor



Fig.2.0: Motor

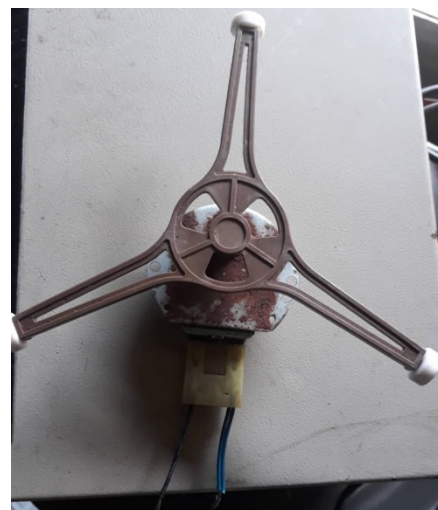


Fig.3.0: Motor with hanger

III. RESULT

The following was the observation during the testing of the bladeless fan

- it is clear that for short distance we get more air from a table fan but in case of long distance, bladeless fan gives more air.
- The distribution of air is more uniform in case of Bladeless Fan.
- Noise intensity is low in Bladeless Fan as compared to Table Fan.
- Bladeless Fan occupies less space than a Table Fan.
- From safety considerations table fan is less safe as it requires more covering to avoid contact with blades. Where as in bladeless fan this is overcome by the fact that blades are hidden in the base.
- These are comparatively easy to clean as most of the area is exposed.
- No grills are required in case of bladeless fan.



Fig.4.0: the final construction

IV. CONCLUSION

This idea of making Bladeless Fan is effective in almost every aspect mainly the safety considerations and noise intensity as compared to a normal table.

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