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Modification of Oscillating Mechanism of Standing Fan ForThrowing Air At 240º

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Abstract: *A mechanical fan is a powered machine used to create flow within a fluid, typically a gas such as air. A fan consists of a rotating arrangement of vanes or blades which act on the air. The rotating assembly of blades and hub is known as an impeller, a rotor, or a runner. Usually, it is contained within some form of housing or case.Mechanically, a fan can be any revolving vane or vanes used for producing currents of air. Fans produce air flows with high volume and low pressure (although higher than ambient pressure), as opposed to compressors which produce high pressures at a comparatively low volume. A fan blade will often rotate when exposed to an air fluid stream, and devices that take advantage of this, such as anemometers and wind turbines, often have designs similar to that of a fan.*

Keywords :*Mechanism, modification, oscillation, table fan, Motor.*

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I. Introduction

Oscillating fans are used to aid air circulation throughout a space. These electric fans feature the ability to direct airflow from one side to another. This allows the fan to cover more space with the breeze it produces as opposed to box fans and ceiling fans that cover only a single direction or a single area with their wind. The earliest oscillating fans were first developed in 1907, based on a concept for ceiling fans. Previously, all electric fans were like ceiling fans, in that they could direct air towards one direction only. Engineers found a way to improve on the original design of electric fans by adding a split-ball joint, which allowed for the fan to be redirected. This was a big improvement from previous fans that only pointed one way. The design for this was further improved by mechanizing the fan's directional control. By moving the fan's head from side to side, the new fan could effectively push a breeze to more than one direction. Thus was created the first version of the modern oscillating fan. Some more improvements on the electric fan have been developed over the years. There are models that also have a built-in electric heating system. These warm the air and expel it, creating a warm thawing wind. Majority of oscillating fans are used to help provide a cool wind in households, office spaces and other indoor spaces. The most advanced electric fans bend the air as they it expel in different directions, covering the entire room while doing away with mechanical motions characteristic of traditional oscillating fans.

By 1910, most fan makers were using rounded edge blades, if not designs they had patented themselves. All major manufacturers were making some form or wind driven, or mechanical oscillator. Motors were all enclosed by now as well as smaller in size.

The decade of 1910-1920 brought major changes. Around 1910, electric fans were being made for residential use. These “Residential Fans” were made for the bedroom. They had six wings, and ran at a slower speed for quietness. Fans were still a major appliance. By 1912, makers were able to “spin” brass housings on small fans. Shortly afterward, they could “spin” or stamp steel for motors as well as bases. As World War 1 neared, there were brass shortages, due to the need for brass in ammunition. Almost all makers used black as their color on the fan bodies, but General Electric went to a deep green color.

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II. Construction of Standing Fan

The basic elements of a table fan include the base, stand, fan blade, blade guard, motor, motor housing, gearbox, oscillating link and shaft.

1.1 Blade

Blades (also known as paddles or wings) usually made from wood, plywood, iron, aluminum. The blades are designed such that they can supply proper and smooth air delivery. Its main function is to take air from back side and throw air to front side at constant speed. Blades are mounted on motor shaft with the help of a key.

1.2 Motor

Standalone fans are usually powered by an electric motors, often attached directly to the motor's output, with no gears or belts. The motor is either hidden in the fan's center hub or extends behind it. For big industrial fans, three-phase asynchronous motors are commonly used, placed near the fan and driving it through a belt and pulleys. Smaller fans are often powered by shaded pole AC motors, or brushed or brushless DC motors. AC-powered fans usually use mains voltage, while DC-powered fans use low voltage.

1.3 Bearing

The main work of the bearing is to convert rotary (mechanical) motion of shaft (inner end) into stationary or static (outer end) energy of guard. Its inner end is connected with motor shaft and outer end with guard. A bearing is a machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts. The design of the bearing may, for example, provide for free linear movement of the moving part or for free rotation around a fixed axis; or, it may *prevent* a motion by controlling the vectors of normal forces that bear on the moving parts. Most bearings facilitate the desired motion by minimizing friction. Bearings are classified broadly according to the type of operation, the motions allowed, or to the directions of the loads (forces) applied to the parts.

1.4 Regulator

In automatic control, a regulator is a device which has the function of maintaining a designated characteristic. It performs the activity of managing or maintaining a range of values in a machine. The measurable property of a device is managed closely by specified conditions or an advance set value; or it can be a variable according to a predetermined arrangement scheme. It can be used generally to connote any set of various controls or devices for regulating or controlling items or objects.

A voltage regulator is an electronic circuit that provides a stable DC voltage independent of the load current, temperature and AC line voltage variations. A voltage regulator may use a simple feed-forward design or may include negative feedback. It may use an electromechanical mechanism, or electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages.

Electronic voltage regulators are found in devices such as computer power supplies where they stabilize the DC voltages used by the processor and other elements.

1.5 Motor Body

It is housing of electric motor and is mounted on the stand of fan. Its main function is to prevent the dust, smoke and other impurities entering into motor. It includes motor, motor shaft, oscillating mechanism, etc. It`s another function is to reduce the losses of electromagnetic flux (EMF) and to give safety to human. In machines with a rotating part, the fan is often connected to it rather than being powered separately. This is commonly seen in motor vehicles with internal combustion engines, large cooling systems, locomotives, and winnowing machines, where the fan is connected to the drive shaft or through a belt and pulleys. Another common configuration is a dual-shaft motor, where one end of the shaft drives a mechanism, while the other has a fan mounted on it to cool the motor itself.

Window air conditioners commonly use a dual-shaft fan to operate separate blowers for the interior and exterior parts of the device. Where electrical power or rotating parts are not readily available, fans may be driven by other methods. High-pressure gases such as steam can be used to drive a small turbine, and high-pressure liquids can be used to drive a pelt on wheel, either which can provide the rotational drive for a fan.

Large, slow-moving energy sources such as a flowing river can also power a fan using a water wheel and a series of step-down gears or pulleys to increase the rotational speed to that which is required for efficient fan operation.

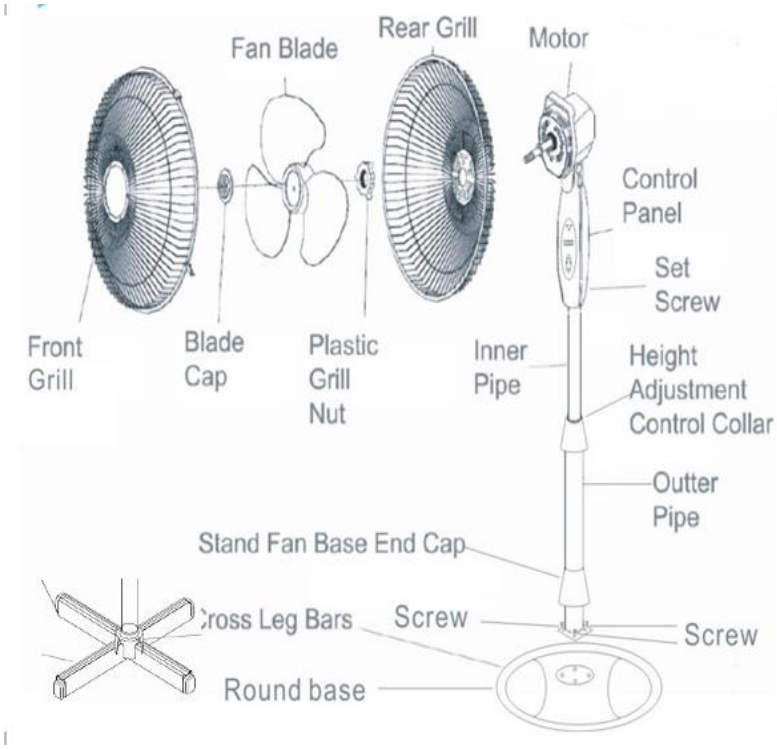

Fig. 1: Assembly of Standing Fan

III. Oscillating Mechanism

A standing fan with oscillating mechanism includes a clutch member for adjusting the angle of oscillation according to user's need. When the motor is actuated, the rotating torque induced by the motor and the transmission mechanism is smaller than the rotational resistance of the clutch member such that the motor may drive the fan to oscillate. Further, when the user applies an external rotational force greater than the rotational resistance of the clutch member, the user can swing the fan to any angle as desired without rotating or shifting other members except the fan and the fan suspension tube. In this manner, undesired damage of the mechanism or motor due to inappropriately applied external force can be avoided efficiently.

Fig. 2: Oscillating Mechanism of Standing Fan

IV. Modified Mechanism

On a hot day, a bit of moving air can greatly improve the atmosphere of any environment. If an air conditioner is out, a fan is a welcome appliance. More air can be distributed to a larger crowd if the fan happens to be an

oscillating fan--meaning that it turns from side to side, changing the direction of its air current. The fan can switch easily between a standard mode and oscillation with the push of a knob.
In modified mechanism of fan oscillating mechanism it consists of two connectors one is male connectors and the another one or other one is the female connectors.

Fig. 2: Side View of Modified Mechanism

V. Conclusion

The conventional table fan throws air in limited front area due to its oscillating mechanism. Due to this limitation, more no. of table fans are required in open space programs like marriage, party, meeting, Katha, etc. where large no. of people are presented. To eliminate this limitation, oscillating mechanism is modified to rotate table fan head 240º horizontally. This type of fan can be placed in center, so cool air can be supplied in all direction and to more area compared to oscillating standing fan.Fans used to cool electrical equipment or in engines or other machines do cool the equipment directly by forcing hot air into the cooler environment outside of the machine.

References

[1] Wedel T, Leung W, Banerjee R, etal.Breakdown of an Oscillating Table Fan. [Internet].Mar 10 2014. [cited 2014 Mar 10]; Available from: wentylacja.com.pl/ Attachment/Fan1-doc-1374.
[2] Sanghani CR. Modification of Oscillating Mechanism of Table Fan for Throwing Air 360º. Journal of Mechatronics and Automation. 2016;

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