# Karupa Foundation
# Education and Research Centre

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# Activity Report

## KFM Developed Air Pollution Mitigation Device for implementing in cites


**Summery**

An air purifier has a body casing. A centrifugal fan is arranged at a substantially center in the body casing. The centrifugal fan has a rotary shaft extending in a depth direction of the air purifier and an inlet port facing frontward in the air purifier. Air suctioned by the centrifugal fan via the inlet port is blown out from the centrifugal fan in a direction perpendicular to the rotary shaft of the centrifugal fan. An air purifying filter is arranged so as to be aligned with the centrifugal fan along the direction perpendicular to the rotary shaft of the centrifugal fan. An air inlet port is provided forward of the centrifugal fan so as to communicate with the inlet port of the centrifugal fan. When the centrifugal fan is rotated, air is suctioned to the inside of the air purifier via the air inlet port. An air outlet port is provided corresponding to the air purifying filter so as to blow out the air purified by the air purifying filter to the outside of the air purifier.


**Principle of Operation and Working**

The Device is designed to suck the ambient air from the atmosphere and direct it towards a series of filters with different filtration capacities. Then the air which is relived of its impurities is passed on to the atmosphere through air vents.

The Device comprises of a 0.5 hp Centrifugal fan which is placed in front of Four filters in the ranges of 10 micron, 5 micron, 1 micron (Washable Fabric Filter) and 0.3 microns HEPA (high-efficiency particulate air / high-efficiency particulate arrestance) filter. The ambient air is first passed through silica gel placed ahead of the filters to remove any moisture content from the air.

The purified air is then passed on to the atmosphere through the air vents. The quality of air is measured at the exit through Particulate Matter Sensors.

**Detailed Description**

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When an operation switch is turned on, the fan motor is activated to start to rotate the centrifugal fan and start the operation of the air purifying filters having the electrostatic dust collecting filter portion and other filter portions that require electric power. When the centrifugal fan is rotated, air in a room is suctioned to the inside of the air purifier through the air inlet port, formed between the upper ends of the front panel and the partition plate, as well as through the recess, formed on the front surface of the electric component accommodation portion, and the air inlet port, formed between the lower ends of the front panel and the partition plate.

The air thus suctioned through the air inlet ports passes through the space between the front panel and the partition plate, the pre-filter, and the bellmouth sequentially. After that, the air is suctioned from the inlet port to the centrifugal fan and then blown from the centrifugal fan along the radial direction of the centrifugal fan by the rotating impeller. In the process passing through the pre-filter, the large dust or hair of pets in the air is collected by the pre-filter and micro-organism such as bacteria and mold adhered to the collected dust is sterilized by catechin in the pre-filter.

The air blown out from the centrifugal fan in the radial direction passes through the left and right air purifying filters In the process passing through the air purifying filters, the floating virus in the air is adsorbed to the bio-antibody filter portions and the dust or pollen in the air is adsorbed to the electrostatic dust collecting filter portions. Further, at the deodorization filter portion of each air purifying filter, the odor component in the air is decomposed and bacteria or mold in the air is adsorbed and removed. The purified air passing through the air purifying filters is blown out to the outside of the air purifier from the left and right air outlet ports.

It is assumed that the air purifier is arranged at the center of one wall in a room. The air purifier suctions air in the room from the front side and blows out the purified air from the left and right air outlet ports. Therefore, air circulation is generated such that the air flows from the

periphery along the wall surfaces in the room toward the front surface of the air purifier. As a result, the air in the entire room is purified efficiently.

The air purifying filters are provided at the left and right sides of the centrifugal fan. That is, the air purifying filters and the centrifugal fan are not aligned along the depth direction of the air purifier. Therefore, the depth size of the body casing is reduced and a thinner air purifier is provided. Since the air purifying filters are arranged at the outlet side of the centrifugal fan, noise of the air purifier is reduced due to a noise adsorption effect and a noise insulation effect of the air purifying filters.

The front surface of the front panel is flat. This improves the appearance of the air purifier and makes cleaning and maintenance of the front panel easy. In the case of the present embodiment, each of the air inlet ports that suction the room air to the inside of the air purifier is formed in a space between the upper ends of the front panel and the partition plate and a space between the lower ends of the front panel and the partition plate, respectively. This makes the front surface of the front panel flat.

Each air purifying filter is arranged at the left side or the right side in the body casing. That is, the air purifying filters are arranged at a plurality of positions in the body casing. This is effective for improving the air purifying efficiency of the air purifier. The left and right air purifying filters have the same shape and size as each other. Therefore, the wind speed distributions of the filters are easily matched with each other. This is effective for improving the air purifying efficiency of the air purifier.

Each of the air inlet ports that suction the room air to the inside of the air purifier is formed in the space between the upper ends and the lower ends of the front panel and the partition plate, respectively, and the air outlet ports that blow out the air purified by the air purifying filters to the outside of the air purifier are formed at the left and right sides of the body casing of the air

purifier. Accordingly, the purified air is blown out symmetrically from the left side and the right side with avoiding a short circuit between the air inlet ports and the air outlet ports. This configuration also makes the wind speed distributions of the left and right air purifying filters to be matched with each other easily.

When the air purifier is arranged at the center of the wall in the room, the air circulation is generated such that the air flows from the periphery along the wall surfaces in the room toward the front surface of the air purifier. Accordingly, the air in the entire room is purified effectively. The front panel and the partition plate are detached from the body casing such that the air purifying filters are exchanged easily and the cleaning and maintenance of the centrifugal fan are carried out easily. Since each of the air purifying filters has various functions of collecting dust and deodorization, the air purifier is useful for various usages.

The room air suctioned to the air purifier passes through the pre-filter to the centrifugal fan. This prevents relatively large objects such as lint from being suctioned to the centrifugal fan. The air suctioned to the centrifugal fan is straitened by the pre-filter. This reduces suction resistance of the centrifugal fan and also reduces noise of the centrifugal fan. When a turbofan is used as the centrifugal fan, the running efficiency of the air purifier is increased and thus the energy consumption is reduced.

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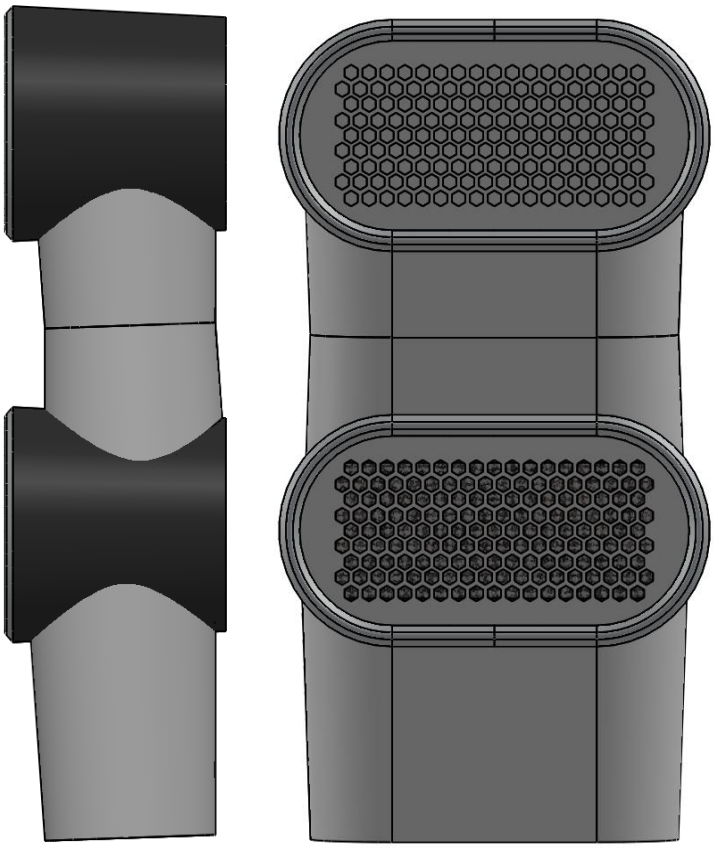

**Outdoor Air Pollution Mitigation Device**

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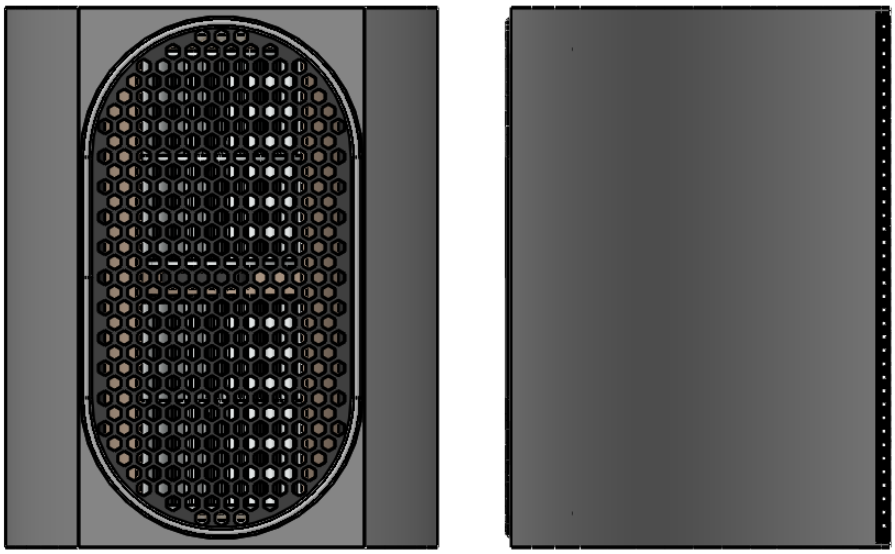

**Indoor Air Pollution Mitigation Device**