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DESIGN AND FABRICATION OF CATCH AND KILL AIR FILTER

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Abstract : *Airborne transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) via air-conditioning systems poses a significant threat for the continued escalation of the current coronavirus disease (COVID-19) pandemic. Considering that SARS-CoV-2 cannot tolerate temperatures above 70 °C, here we designed and fabricated efficient filters based on heated nickel (Ni) foam to catch and kill SARS-CoV-2. Virus test results revealed that 99.8 percent of the aerosolized SARS-CoV-2 was caught and killed by a single pass through a novel Ni-foam–based filter when heated up to 200 °C. In addition, the same filter was also used to catch and kill 99.9 percent of Bacillus anthracis, an airborne spore. This study paves the way for preventing transmission of SARS-CoV-2 and other highly infectious airborne agents in closed environments. Air filters are common enough daily items, familiar to anyone who has ever used an air conditioner on a hot summer's day, but scientist clarified that a common air filter cannot kill the SARS-CoV-2 as well as other highly infectious airborne viruses Hence This project is about designing and fabricating the catch and kill air filter to help essential workers are at elevated risk of exposure mainly at schools, health care facility, hospitals etc. by providing them safety. This project will help people to buy air filters with lower cost and highest safety during this pandemic.*

Keywords *– COVID-19 Pandemic, Infectious airborne Virus, Nickel Foam, Carbon Filter, Electrostatic Precipitator, Fan.*

1. INTRODUCTION

People are more concern about ongoing health issues. Perhaps the greatest challenge remains transmission indoors, where tiny droplets can stay alive for hours. It is driven people out of activities ranging from going restaurants to going on work. In order to face current situation, we must find a solution to overcome this thus we designed an air filter which will help people to be less cautious about indoor spread of virus. The air filter we designed will be compactable and highly efficient as compared to other commercial filters. It will provide maximum safety.

1.1 Requirements and Constraints

As per demand and requirements everyone wants an efficient and affordable light weight air filter. While looking for requirements we found that nickel foam-based air filter would have additional advantages due to its large porous surface, perfect for trapping the virus during the passing of air through it. We constantly focused on low cost and safer filter design, which depends on proper selection of material for filter and quantity of air to be filtered in one pass which in turn depends on the closed area and person inside it.

2. METHODOLOGY

We studied few research paper on Design and fabrication of catch and kill air filter , we try to improve results by considering above result then we come to following methodology.

2.1 Objective and Requirements

We try to build a compact and light weight air filter, which will consume less electricity and work more efficiently. Also, it must kill most of air borne virus. The overall cost must be low.

2.2 Aesthetics

Design must look descent and should have cool color theme on it.

2.3 Literature Review

By looking and the literature review we came to conclude that nickel foam would be best for overheating process and also electrostatic precipitation to counter the charged suspended particles in the air.

2.4 Working

The dirty air travels from the pre filter towards the electrostatic precipitator where in a nickel foam at higher temperature degrades harmful viruses such as corona & SARS- CoV-2(which create lung problems).
For second stage purification carbon fiber is used to remove the dust particle as well as other unwanted tiny particles from the air.
At last for proper flow of air a fan is used to give clean free air.

3. FIGURES AND TABLES

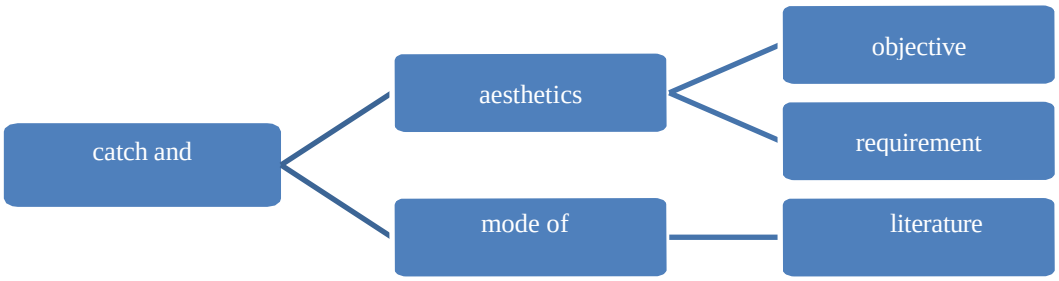

Fig. 3.1 Process Chart

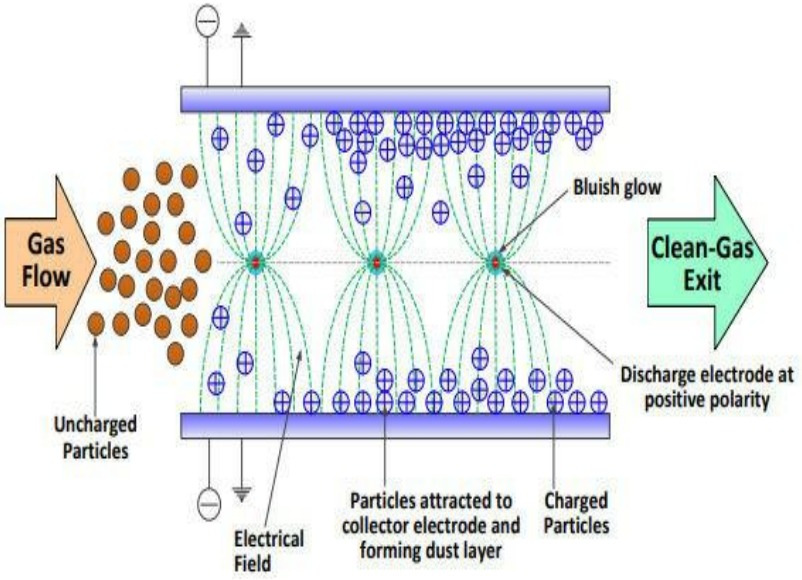

Fig. 3.2 Working of Electrostatic Precipitator

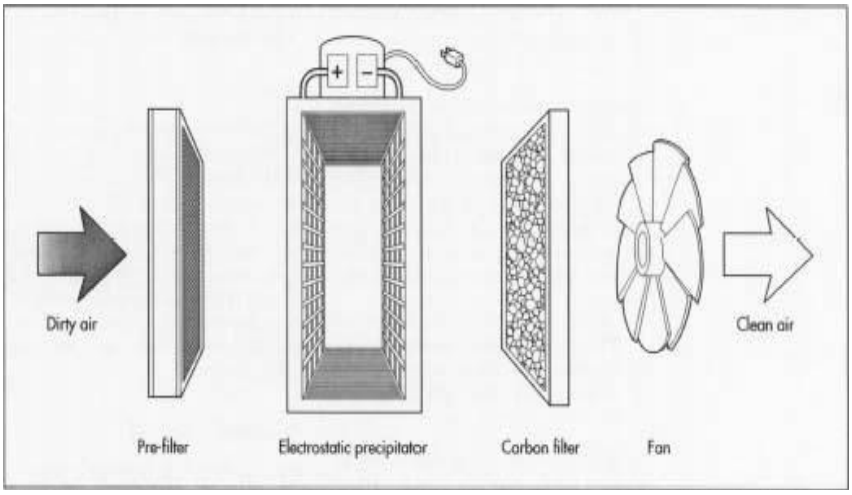

Fig. 3.3 Design of Air Filter

4. CONCLUSION

In a overall process we start with what are the requirements of project. After finding the objective and requirements we start with literature review and find the information related to our project model and compile that. After literature review, we get a basic idea how our project will work. Hence, we conclude that our project literature review, methodology, designing of model is done.

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