

# REDUCTION OF AIR POLLUTION USING SMOG-FREE-TOWER A REVIEW PAPER

S.Laxmipriya\* A.AjayKumar\*\* S.Aravinthan\*\*\* N.Arunachalam\*\*\*\*

\* Assistant Professor, Department of Civil Engineering, Panimalar Engineering College,  
Chennai

\*\* ,\*\*\*,\*\*\*\* Student, Department of Civil Engineering, Panimalar Engineering College, Chennai

\*Corresponding author: S.Laxmipriya\* M.E, Assistant Professor, Department of Civil Engineering,  
Panimalar Engineering College, Chennai, India email.ID:surkash2000@yahoo.co.in

## ABSTRACT:

There are many treatment methods for water and land, but apart from water and land we were in danger of preserving our air. We are in need of oxygen supply that too in pure form. This design of Smog Free Tower is of 4-feet tall and it is of four sided tower. It has one inlet through which smog is sucked into the tower. It also has two outlets, one through which pollutants are collected and the other one releases purified air. The air released from this tower is treated using low electricity. It uses ionization technology, energy friendly, and it is light weight. Air ionisers are used in air purifiers to remove particles from air. Airborne particles are attracted to the electrode in an effect similar to static electricity. Our nose can filter upto PM10 but it cannot filter less than PM2.5. When this size of polluted harmful air is inhaled it can directly be passed through the lungs. This affects our respiratory system very seriously. This tower is very effective in industrial and commercial areas and it is not located in residential areas.

## 1. INTRODUCTION:

Anti-pollution technology is receiving a breath of fresh air in China. This technique is highly beneficial in treating air. Today we are developing technology in every field from developing robots to becoming their masters. But least care is taken care in utilizing the environment efficiently. We already damaged most part of the nature. This project can be effectively used to treat the environmental air. This is a baby step in maintaining and improving the environment as it is not possible to replenish the environment immediately. The tower works in simple way as it sucks in dirty air like a giant vacuum cleaner. Ionization is the process where an atom loses an electron. The atom's core contains neutrons and protons. The neutrons are neutrally charged, the protons are positively charged. The core is therefore positively charged. A complete atom however, is neutral, caused by the negatively charged electrons circulating its core. The electrons' mass is much smaller than that of the protons or neutrons. And yet it takes the same amount of protons and electrons to discharge the atom. Because an electron is just as much negatively charged as the proton is positively charged. An atom will get a positive charge when the electron loses it. A charged atom is called an ion and the atom then is ionized.

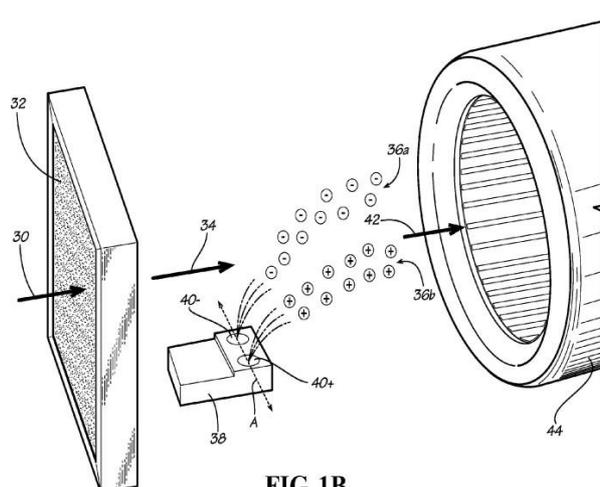
## 2. LITERATURE REVIEW:

The working of the **Smog Free Tower** had been validated by Professor “Dr.BertBlocken” of the Eindhoven University of Technology and was successfully implemented in China and Poland. The only limitation is that this tower can treat only small areas covered up to certain radius. Smog free project is a series of urban innovations to reduce pollution and provide an inspirational experience of a clean future. Smog free tower, Smog free ring and Smog free bicycle provide a local solution of clean air in public spaces.

**Air filters** use fine sieves that filter particles with air circulation. This filter exchanges the air in the room by using a fan to draw the air through the purifier. The impurities remain on the filter leaving pure air to continue on through the machine and re-enter the room. As air flows into the purifier, the finer the sieve is, the smaller the particles it can trap onto the filter. HEPA air filters are made from very tiny glass fibers that are made into a tightly woven paper. They are guaranteed to trap 99.97% of airborne particles above 0.3 microns. The more times the air passes through the HEPA filter the cleaner the air will be. Ionisers are distinct from **Ozone Generators**, although both devices operate in a similar way. Ionisers use electro-statically charged plates to produce positively or negatively charged gas ions (for instance  $N_2^-$  or  $O_2^-$ ) that particulate matter sticks to in an effect similar to static electricity. Even the best ionisers will also produce a small amount of ozone,  $O_3$ —which is unwanted. Ozone is the tri-atomic state of oxygen, that is, it is a molecule comprising of three oxygen atoms having the chemical symbol  $O_3$ .

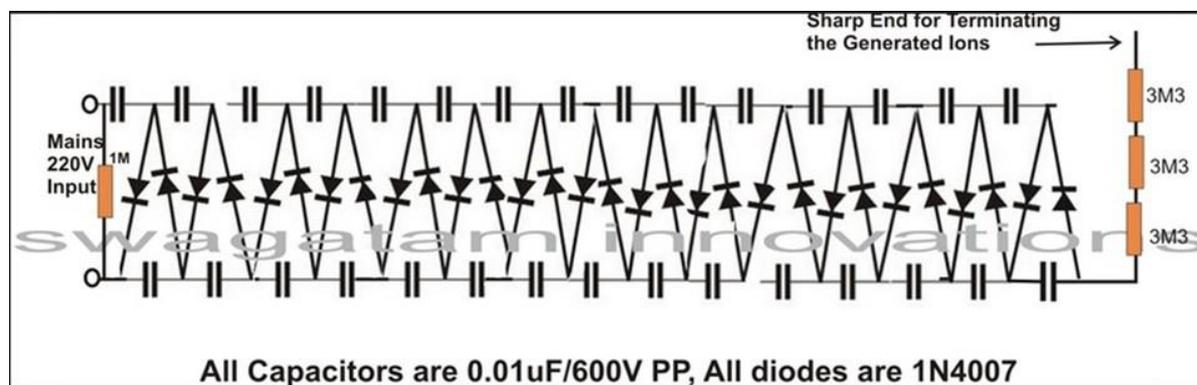
## 3. METHODOLOGY:

By creating a field of ions, all the particulate matters gets positively charged. Therefore when the ground is negatively charged, the particles are attracted to the ground. The other method is using UV ozone generator.



#### 4. NEGATIVE ION GENERATOR:

Negative ions are air molecules with one or more excess electrons, and can be produced artificially by a low-power, high voltage (about 5 to 14-kilovolt) DC supply. The positive terminal is grounded, and the other (the emitter) is a needle exposed to air. Extra electrons on the emitter's surface produce a high local electric field owing to its pointed shape. The electrons exit the emitter needle's surface due to the polarization of surrounding air molecules between the emitter needle and ground. The electrons collide with the air molecules and produce negative ions. What actually causes electron excitation (corona) is the high electric field at the tip which is directly proportional to the voltage and is enhanced by sharpening an electrode tip to a fine point. The high electric field strains the air molecules polarizing them by a phenomenon called dipole polarization. Air molecules are forced to accept electrons creating negative ions. The negative ion generator described here is low-cost and easy to build. It generates high voltage, but at very low current. However, safety precautions must be taken, as for any high-voltage device.



#### EXPERIMENTATION PROCEDURE:

1. The smog free tower is initially placed in a closed room.
2. Bentoin Resin is used to produce smoke. Since it is an organic compound, on burning it will produce smoke mixed with carbon.
3. This air is sucked into the tower through the blower attached at the top of the tower.
4. The toggle switch is now switched to ioniser from blower.
5. Carbon in the smog is positively charged ion and the negative ions are produced using negative ion generator through circuiting.
6. This will attract the charged carbon to the ground in the form of impurities.
7. They are then collected separately and the pure air is now sent out through the outlet at the top of the tower.

8. The quality of the air can be measured in real time by using O<sub>2</sub> analyser, CO analyser, CO<sub>2</sub> analyser and many types are available.
9. Here, we are using filter paper to analyse the quality of the air.
10. The filter paper is soaked in water and it is kept at the outlet of the tower.
11. The black spots in it shows the impure concentration of the purified smog.
12. The results are noted.

#### **ADVERSE HEALTH EFFECT:**

A number of studies have been carried out on negative ion generators. Some studies show that the ozone generated can exceed guidelines in small, non ventilated areas.[10] One study showed that ozone can react with other constituents, namely cleaning agents to increase pollutants such as formaldehyde (importantly, this study had as its objective the testing of the use of cleaning products and air fresheners indoors and associated health risks as opposed to adverse health effects of air ionisers)

#### **CONCLUSIONS:**

Ionization is part of a healthy atmosphere. It is one of nature's tools for maintaining and cleaning the air. Though positive and negative ionization exist together naturally in the atmosphere, and abundance of negative ionization appears to have very beneficial effects on humans, animal, and plants while an abundance of positive ionization seems to be detrimental. Human activities tend to decrease the amount of negative ionization in the atmosphere. The problem is only greater when examined in the context of the indoor environment, especially if one considers how much time the average city-dweller spends breathing indoor air. Technology designed to generate negative air ions can appropriately address many issues related to indoor air quality, provided that such technology already exists; although up to the present time it has been employed only in one primary application. With a wider dissemination of this information, perhaps a wider range of indoor environments will realize benefits from this technology.

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