

Cost effective Pollution Free Modular Stove

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Abstract

Our project is basically a stove which will help us to reduce the carbon content from the smoke which is formed during burning of fuel such as wood, cow dung, etc. It consists of three main parts, air blower, main body and exhaust system.

Air blower will help us to keep fire burning. In main body the burning of fuel will take place. Exhaust system will reduce the carbon content from it.

This stove will help us to reduce to the various health problems and would, also allow clean and less-polluting cooking environment.

Keywords: *Air blower, Exhaust system, less polluting, smoke.*

History of stoves and its problem:

Our project is based on the idea for helping the poor people who still use the conventional fuel gas stoves for cooking food, which aren't nature friendly. These conventional stoves emit a lot of smoke, which in turn causes a lot of air pollution and harms the health of the people around causing major problems like asthma, eye irritation, etc.

These stoves are very much inefficient and there is a lot of heat loss which doesn't allow proper cooking.

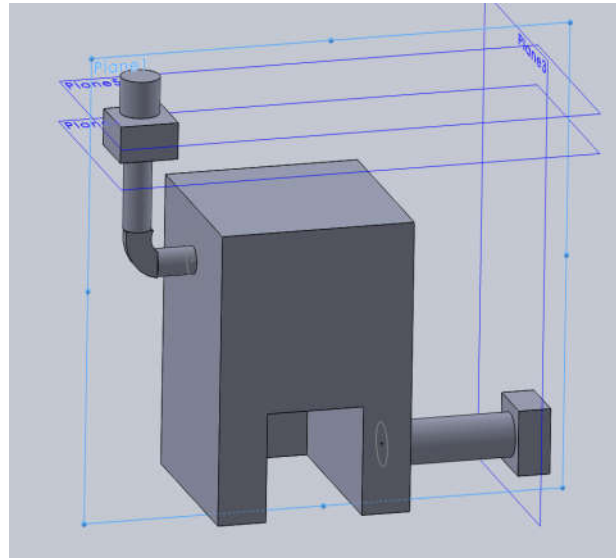
Traditionally used, open fires or poorly ventilated stoves, in which, solid fuel burning is a significant source of indoor air pollution. Solid fuel smoke contains thousands of substances, many of which are hazardous to human health. For example, carbon monoxide (CO); nitrous oxide; Sulphur oxides; a range of volatile organic compounds, including formaldehyde, benzene and 1,3-butadiene; and polycyclic aromatic compounds, such as benzo-a-pyrene, which have both short and long term health consequences.

Cooking over a traditional open fire or mud stove can cause increased health problems brought on from the smoke, particularly lung and eye ailments, but also birth defects, mainly for women and children, as they spend major time in domestic hearth..

The use of indoor cooking units has been shown to increase the risk of developing asthma by 2 to 3.5 times when controlling for all other factors. Studies show that in addition to the irritants being inhaled, exposure to the indoor cooking units actually changes children's pulmonary response to the irritants with a more reactive and inflammatory response that may last well into adulthood.



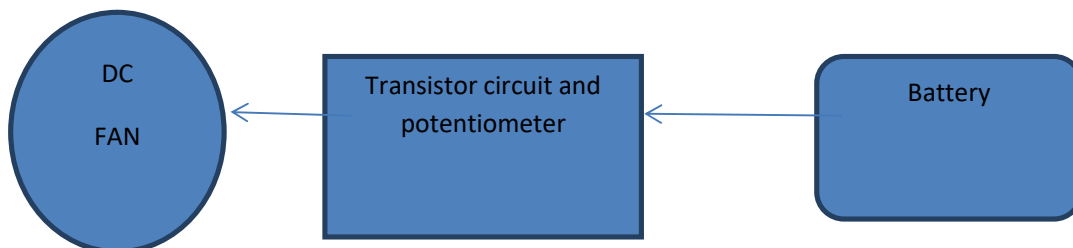
Model of stove:



Detail information of model

1) Air Blower

It is use for blowing air into the stove..It helps us to keep fire blowing. The air blower consists of a 12V DC fan and a regulator which consists of transistor circuit, potentiometer, and a battery. We can control the speed of air by regulator which will help us to control the speed of air..These will help us to control the flames of fire.



Inner coating

Inner coating of oil can is done by the fire clay which protects the can from heating up. Fire clay ($\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$) can withstand temperature of 1775 degree celcius. Fire clay consists of natural argillaceous materials ,mostly Kaolinite group clays, along with fine grained micas and quartz, and may also contain organic matter and sulphur compounds.

Fire clay is resistance to high temperature having fusion points higher than 1600 degree Celsius, therefore it is suitable for lining furnaces, as fire bricks.

2) Exhaust

The exhaust system is use to purify the smoke generated by burning .The exhaust system consists of a L shape tube above which a box is attached to increase the surface area for adsorption .For adsorbing the smoke we are using activated charcoal .For doing these we have coated the inner surface of tube and box by activated charcoal which is a good adsorbent.



3) Cook top

The cook top will consists of a wire mesh and it there will be a three leg stand for keeping vessels on its place. There will opening on the top of the stove which will provide heat to us for cooking purposes.

Heat transfer mechanism:

Heat is transfer by various ways such as conduction ,convection ,radiation .

Conduction:

Conduction is the transfer of heat by microscopic collision of particles and movement of electrons within a body .The microscopically colliding particles, that include molecules ,atoms and electrons, transfer disorganized microscopic kinetic and potential energy, jointly known as internal energy. Conduction takes place in all phases of matter including solids ,liquids ,gases ,and waves,

Convection:

Convection is the heat transfer due to bulk movement of molecules within fluids such as gases and liquids , including molten rock .Convection takes place through advection, diffusion or both

.Convection cannot take place in most of solids because neither bulk current flows nor significant diffusion of matter can take place

Radiation:

Radiation is the emission or transmission of energy in the form of waves or particles through space or through a material medium. Radiation takes place through transmission, of photon, unlike conduction & convection; there need to be no intermediate matter to enable transmission .The significance of this is that radiation will be the only mechanism for heat transfer whenever a vacuum is present.

In our stove the heat transfer takes place through conduction convection and radiation.

The loss of heat due to radiation is prevented by inner coating of fire clay on the inner walls of stoves the cooking of food kept utensils takes place mainly due to conduction and convection

Problem statements:

1. Health impact on women and children.
2. About one million death, are reported in India, due to household air pollution caused by smoke from cooking.
3. In the traditional ways of cooking, like three stone stove, there is a use of fossil fuels, like coal, wood.
4. Women are spending more time near cook stove, as cooking time is high in traditional cook-stoves.

Health problems are mainly caused due to the smoke, therefore the smoke is adsorbed is with the help of smoke-adsorbers. In our project, we are specially using, activated charcoal as it's the best carbon-adsorber and the smoke evolved mainly contains carbon.

As , we are using improved cook-stove , thermal efficiency of cook stove is gradually increased as , compared to traditional cook-stove.

References:

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