



Design of Smokeless Challah with Briquettes

Somesh Dakaha^a, Aniket Nandeshwar^b, Janvi Surjuse^c, Rajkumar Wadbudhe^{d}*

^{abc}Student, NIT Polytechnic, Nagpur - 441501, India.

^dHOD Mechanical Engineering Department, NIT Polytechnic, Nagpur - 441501, India.

ABSTRACT

Clean Energy is required for the good environment. Access to and affordability of clean energy consequences in better excellence of life. More specifically, biomass use for cooking leads to health hazard from inhaling smoke and drudgery from fetching the fuel. State Government and at Central level have formulated numerous programs for ensuring use of clean fuel for cooking. Unfortunately, in spite of technological progress, the use of smokeless chullah has not been up to expectation because of organizational and social factors. The problem is partly the fuels used and partly the lack of ventilation. Cooking on open fires and stoves without chimneys using basic fuels such as wood, animal dung, crop waste and coal, emits hazardous smoke that causes irreversible ill health and killer diseases. Unimportant soot or dust particles penetrate deep into the lungs, causing lung cancer, child pneumonia and chronic uncooperative pulmonary disease. Women and children, whose traditional place is in the kitchen, are the most common fatalities. Household Air Pollution is one of India's most devastating killers, claiming more lives each year than HIV, Malaria and TB combined, according to World Health Organization (WHO) figures. This totals to 1 million rashlosses in India and more than 4 million globally. In this designed stove, superheated steam is used as a secondary oxidizer which provides a number of advantages for increasing the burning efficiency and reducing the generation of smoke. Superheated steam possesses a large amount of heat energy as it carries the latent heat of vaporization of water at higher pressure. Adding water vapor to a high-tem flame can increase the reactivity by catalyzing action. This is in addition to an increase in the concentration of radicals contributing to the reactive gasification of the medium. The associated release of energy will also provide additional heat for the endothermic gasification reactions.

Keywords: Chullha, Smokeless, Gasification, Pressure.

1. Introduction

In increasing awareness of the harmful effect of fossil fuels on environment and consequently quality of life of people, both government and households are looking ensuring availability of reliable clean energy. Although people are not ready to accept at the cost of health, environment natural resources. Fortunately technology has paved the way for alternatives such as biogas plants, smokeless stoves, solar water heater, solar cooker, solar street lights, pumps, wind electric generators, biomass gasifies and small hydro electric generators to name a few. However their use is limited because of weak institutional arrangements. Over 2 billion people in the emergent world use biomass as the principal source of household energy for cooking activities, agriculture, boiling water and heating, for example the recent air pollution in Delhi has bought in Supreme Court of India to intervene through Judicial process Household Air Pollution (HAP) generally caused by solid fuels used in traditional cooking methods, is responsible for over 3.8 Million premature deaths every year as per the latest WHO data. This is about 7.7% of the total global mortality. The WHO ranks this problem as one of the worst health risks facing the poor. In low-income countries, such as those in Africa and Asia, indoor smoke from cooking has become the sixth biggest killer. India alone explanations for about 1 million deaths or about 25% of the total death burden amongst women and children globally due to HAP. The unruly is partly the fuels used and partly the lack of aeration. Cooking on open fires and stoves without chimneys using undeveloped fuels such as wood, animal dung, crop surplus and coal, emits perilous smoke that causes irreversible ill health and killer diseases. Small soot or dust particles penetrate deep into the lungs, beginning lung cancer, child pneumonia and chronic obstructive lung disease. Women and children, whose traditional place is in the

kitchen, are the most common victims .Household Air Pollution is one of India’s most devastating killers, claiming more lives each year than HIV, Malaria and TB combined, according to World Health Organization (WHO) figures. This volumes to 1 million impulsive deaths in India and more than 4 million worldwide.

1.1. Aim and Objective :

The main objective is

- 1) To reduce the smoke and carbon present in it
- 2) To improve safe and healthy environment in the kitchen
- 3) Time saving in fetching fire woods
- 4) Reducing drudgery of farm women.

2. Literature Review

- 2.1 “Umaira Dilshad, Anjali Rajput, Ruchir Kr. Chauhan”, “Smokeless Chulhas: A Step towards Energy Conservation”, June 2020, In this paper they show that there is a need of more efforts to make people aware about smokeless chulha. Public must be aware about the benefits of using smokeless chulha over traditional chulha. There is need of imparting more gen to women about smokeless chulha and its helpfulness like its non-hazardous effect on health of all family followers because if people are healthy then only society will progress. More programmers are needed to be launched by government for adoption of smokeless chulha by rural people. If people become aware then there will be more adoption of smokeless chulha. Thus, there is need of launching more and more programmers by government.
- 2.2 S. Roma Devi, L Kanta Singh, Contribution of Smokeless Chulha for Rural Cooking in Churachandpur District, Manipur, August 2018 It is the study of Manipur have experienced a rapid depletion of natural forest resources that has resulted in hardship for the people living in rural areas, especially women and children who spend a considerable part of their time and energy in search of fuel wood and often have to cover long distances. Besides, deforestation has also led to many negative ecological consequences. The smokeless chulha is good technology and it's affordable for most people in rural areas. The smokeless chulha could save huge amount of natural resources by reducing the cutting of forest. It is a boon to the rural people of Manipur
- 2.3 Ramesh Chandra Nayak, Manmatha K. Roul, Prateek Debadarsi Roul, “Design and development of smokeless stovefor a sustainable growth,” August 2021, The main objective of this work is to design and develop a smokeless stove to improve thermal efficiency and reduce air pollution that will not only reduce the cooking cost but also provide a better environment for rural women. The thermal efficiency of the designed stove is 10–17% higher than that of the traditional chulha.

The flame temperature of this stove ranges from 595_C to 700_C, which not only reduces the cost of cooking but also reduces the cooking time. Due to the provision of secondary oxidizer (superheated steam), complete burning of primary fuel occurs, as a result of which ash formation, as well as the formation of harmful gases, reduce.

3. Components

1. Oil Tin: Plain oil tin ampule of the rectangular shape used for comprising oil which is made up of tin material.
2. Cement: Cement is a binder, a substance used for edifice that sets, hardens, and adheres to other materials to bind them together. Cement is seldom used on its own, but rather to bind sand and shingle together. Cement mixed with fine aggregate foodstuffs mortar for granite, or with sand and gravel, produces concrete.
3. Sand: Sand is a loose granular material blanketing the beaches, riverbeds and deserts of the world. Collected of different materials that vary reliant on location, sand comes in an arrangement of colors including white, black, green and even pink. The most common component of sand is silicon dioxide in the form of quartz.
4. Water Pipe: A smoking device that consists of a bowl mounted on a vessel of water which is providing with a long tube and arranged so that smoke is drawn through the water where it is cooled and up the tube to the mouth.

5. Water Tap: A faucet for drawing water from a pipe or cask.

6. Filter Air: A particulate air filter is a device serene of fibrous, or porous materials which confiscates solid particulates such as dust, pollen, mold, and bacteria from the air. Filters comprising an adsorbent or catalyst such as charcoal may also remove odors and gaseous pollutants.

7. Wheel: A wheel is a circular component that is planned to rotate on an axle bearing. The wheel is one of the key components of the wheel and axle which is one of the six simple machines.

8. Grill Alloy Steel: It is made up of all types of stainless steel, called inox, are made of iron and contain at least 10% chrome, which make them rust resistant. They contain other elements like nickel, which will affect the resistance, strength, the look and also the magnetism.

9. Water tank: A water tank is a container for stowing water. Water tanks are used to provide storage of water for use in many applications.

10. Briquettes: A briquette (also spelled briquette) is a compressed block of coal dust or other explosive material (such as charcoal, sawdust, wood chips, peat, or paper) used for fuel as well as for kindling to start a fire.

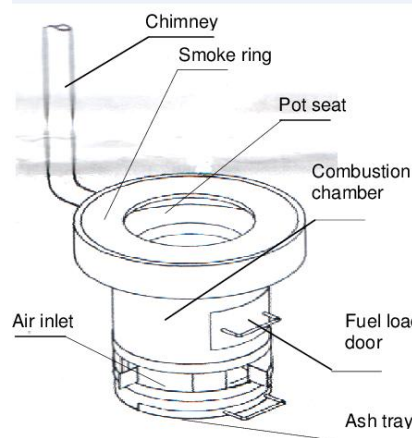


Fig. 1 –Smokeless Chullah

3.1 Construction :

The design of smokeless chulla using briquettes entails of oil tin base, cement, sand, water pipe, water tape, exhaust pipe, air filter, and wheel. Grill alloy steel and water tank. Oil tin base is used to make a chulla of that rectangular base. Smokeless chullas can be easily built using locally available material. The total energy used for domestic cooking is about 70-80% of the total energy accessible in the village and about 80-90% of domestic cooking energy is saw from fuel wood. A briquette used which is a trodden block of coal dust or other combustible material (such as charcoal, sawdust, wood chips, peat, or paper) used for fuel as well as for kindling to start a fire.

3.2 Working :

Chulha is a traditional Indian cooking stove used for indoor cooking. Chulha is a U-shaped mud stove made from local clay. After the clay formation is complete, it is finished by lid it with a coat of clay and cow dung mixture. The thickness of the walls is not as important as the dimensions of the fire-side are. The smokeless chulha is built expending bricks, an iron rod and a pipe for the seepage of smoke. According to a report by Sri Sri Institute of Agricultural Sciences & Technology Trust, the smokeless chulha uses up to 50 per cent less firewood than the traditional chulha.

4. Result and Conclusion

The results of the research that have been accepted out provide the subsequent conclusions:

- The resulting bio briquette stove design is a stove with glass wool-coated walls.
- In the stove, it is added with holes in the missile to remove ashes so that it does not accumulate, as well as an air supply from the fan.
- The bio briquette stove that has better efficiency between cement wall disparities and glass wool coated walls is a stove with glass wool coated walls, which is 40%.

- Of the three forms of bio briquette (ellipsoidal, cylinder, perforated cylinder) the use of cylinder-shaped bio briquette is better because the flame on the briquette is longer when compared to others.

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