



Advance steam boiling cooker

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Abstract- In all over the world the food demand is increases in day to day life. The million tons of food are consumes every day and also requires lots of energy to prepare it. The existing conventional system for boiling the food is very slow and requires more fuel consumption. It hazardous sometimes and also pollute environment. Due to all this problems we confidently solved these by replacing it with new system. In this project we rectify all problems regarding existing system and develop Advance water less cooker. In which steam stored within a single unit and as per requirement it passes to different boiling processes. By this type of system the food can prepared by minimum loss of energy as well as very easy and fast. The objectives are to design the system parts, experiment evaluation of it and comparison with current system.

Key words- 15 liter cooker(as consider as a boiler); safety valve; insulting pipe; sub cooker; burner

I.INTRODUCTION

Majorly in India people are most interested in the food. These people are very convenient in the test full food and various dishes. Also India is very religious place where the food serves around 10,000 people. Sometimes this food is not the quality food. So to cook the quality food some new technique requires. When go further the way to find out the new technique of the boil the food. In this research paper used method around 30% of energy saving and boiled food will fast to serve. In normally, while boiling the food to take such time and take a more energy but we are applied this method to get efficient and best quality of food. In advance steam cooker water energy is converted in to heat energy by potential heating source (gas, oil, fuel or biomass wastages) and water converted in to steam energy. We have selected the closed vessel and generate the steam in this closed vessel and this steam is supplied to the vessel or place which we are used.

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Pressure cooking is the way toward cooking food, utilizing water or other cooking fluid, in a fixed vessel, known as a pressure cooker. As Advance steam cooker cooks food speedier than routine cooking techniques, it spares vitality. Pressure is made by heating up a fluid, for example, water or soup, inside the shut pressure cooker. The caught steam builds the inside pressure and permits the temperature to raise. After utilize, the pressure is gradually discharged so that the vessel can be securely opened.

II-CONVENTIONAL COOKER PROBLEMS

The conventional cooker has following problems:

- The steam is delivery valve not proper in as per required in work.
- The accurate steam reduces between the main cooker and sub- cooker
- The typical boiler used are consists of mechanical component and frame structure. There is no awareness about using latest technological devices.
- Therefore by implementing those equipment and devices along with existing system, and by making required modification, it is possible to develop system that can communicate with user for its better working.
- The first difficulty experienced is to find out material of component and steam boiler which has the capability to produce high steam and high pressure carrying capacity.
- To look out for proper sensor that can fully utilize power generated into the shaft work.
- If boiler is placed then the steam generation ratio will be increases.

III- CONCEPT OF ADVANCE BOILING COOKER

In conventional boiling cooker there are numbers of problem facing which are discussed above. In conventional cooker we boil the food and water so time as well as energy consumption is more. In advance steam cooker here we have produce the steam in one unit and achieved the 10 kg/cm^2 pressure and this pressured steam is supply the another sub cooker, in this cooker we had boil the food. Pressure gauge is also attached to the steam generating unit to reduce the hazardous situation. Water and foods are poured in separate unit and food will prepare by steam.

The advantages of advance boiling cooker are following:

- To get the quality of food.
- To save the energy.
- To save the time.
- Remove the accident situation.

IV- ADVANCE BOILING COOKER

In advance boiling cooker steam is generated and this steam will use to prepare the food. But the use of steam is very vast. In hotel industries steam is use to cleaning purpose, heating purpose. In power generation industries steam is used to generate the power but after power generation the west exhaust steam can be utilized for food preparation for employees.

Application of steam.

- Heating
- propulsion
- motive
- automation
- cleaning
- miniaturization
- humidification

Steam is used to clean a wide range of surfaces. One such example from industry is the use of steam in soot blowers. Boilers that use oil or coal as the fuel source must be equipped with soot blowers for cyclic cleaning of the furnace walls and removing combusted deposits from convection surfaces to maintain boiler capacity, efficiency, and reliability.

V-DESIGN CALCULATION

Design calculations for research purpose are given here under:

- Conventional boiling cooker fuel consumption:

What is the fuel consumption of a 100 kg/hr. steam cooker using as fuel (VHI = 130,000 BTU/gal) with a feed water temperature of 154 °F?

$$\begin{aligned} FC &= [SP * (hs - hw) / (CE * VHI)] \\ FC &= [SP * (hs - hw) / (CE * VHI)] \\ FC &= [10000 * (1190 - 122) / (0.8 * 130000)] \\ FC &= 102.7 \text{ gal} \end{aligned}$$

Where,

FC = Fuel consumption

SP = steam produced

hs = enthalpy of steam @ 100 PSIG

hw = enthalpy of feed water saturation temperature

CE = cooker efficiency

VHI = Fuel heating value

- FACTOR OF EVAPORATION

Water poured in to the cooker at normal temperature. The cooker pressure is 10 kg/cm^2 and the cooker water temperature is 175°C . The latent heat is 450 Btu.

$$FE = SH + LH / 970.3$$

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$$FE = ((175 - 100) + 450) / 970.3$$

$$FE = 0.5410$$

Where,

FE =factor of evaporation

SH = sensible heat

LH = latent heat

970.3 latent heat of evaporation of water at 212°F . (Constant)

➤ RATE OF COMBUSTION FOR GASEOUS OR LIQUID FUELS

$$RC = H / (V * t)$$

$$RC = (3825.2 * 1100) / (45.5 * 1)$$

$$RC = 92477.36$$

Where,

RC= rate of combustion (Btu/hr.)

H =heat released (Btu)

V= volume of furnace (cu. ft.)

T=time (hr.)

➤ STATIC HEAD PRESSURE

Static head pressure of a cooker operating at 10 kg/cm^2

$$SHP = Bpr * 2.31$$

$$SHP = Bpr * 2.31$$

$$SHP = 10 * 2.31$$

$$SHP = 23.15$$

Where,

SHP= static head pressure

Bpr = cooker pressure (kg/cm^2)

➤ STEAM PRODUCED

How much steam will a 15HP make in 76 minutes?

$$S = HP * 34.5 * T$$

$$S = 15 * 34.5 * 76$$

$$S = 65.5$$

Where,

S =steam

HP= HorsePower

34.5 =constant (lb/hr)

T=Time (hr.)

VI- WORKING OF ADVANCE BOILING COOKER

Working of the system is very simple. Advance boiling cooker is one of the cheapest method preparing the foods. In one unit we had generate the steam with the help of gas burner and generated the pressurised steam. Pressure gauge is attached with the steam generation unit. After generation this steam it passed with the help of Teflon pipe, which is flexible, and transferred to sub cooker. Subcooker consist the food we want to cook. So by the help of pressurised steam coming from main cooker the food was cooked.



Fig-1 steam generating unit



Fig-2 steam supply system

VII- RESULT

The following results were taken by the experiments:

Table 1- experimental result

Sr. No.	Vegetable Species	Cooking Time(min)	
		Steaming	Boiling
1.	Cauliflower	8	9
2.	Cabbage	7	5

3.	Green pea	5	6
4.	Banana Blossom	5	8
5.	Beetroot	7	8
6.	Teasle gourd	8	10
7.	Black eyed Pea	6	7
8.	Bottlegourd	5	6
9.	Tomato	3	3
10.	Carrot	3	5
11.	KharuaBrinjal	4	4
12.	Radish	5	5

VIII – CONCLUSION

From this experiment we can conclude that this steam boiling cooker achieved the objective which are mention in this paper and fulfil the various objective which mainly affected on the save the energy and time consuming method and to get the best quality of food.The outcome of this present study is positive. Here our design incorporates very basic boiling system to avoid complexity and cost issue. It has wide scope of application for commercial and domestic places. This waterless boiling system will replace typical existing boiling system.

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