DESIGN AND FABRICATION OF RICE VENDING MACHINE

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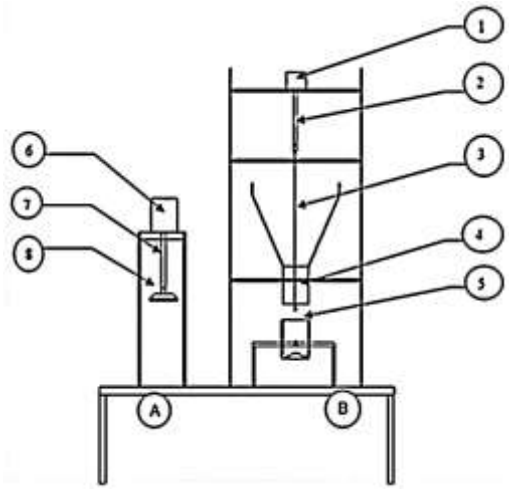
Rice is very important food for the people in India. Nowadays rice is being cooked and served manually. With the advancement of technology, instrumentation has penetrated to the nook and corner of our life. So people started using these technologies to fulfil their needs. Already, machines for vending boiled noodles, soups, beverages, ice cream have entered the market. But still, no machines have been invented for supplying cooked rice. Rice maker is one of the important electrical machines that's required in our life routine like any corn or noodles vending. The project attempt in studying the existing appliances, their advantage, disadvantages and will attempt in designing and developing an automated appliance for the rice cooking, using DC rechargeable supply. The part modelling for rice vending machine and its assembly are done in the design phase. The control of the equipment is through a microcontroller. The entire work will be fabricated and tested.

***Keywords*:** Electrical Energy, Food Processing, Microcontroller, Solar energy.

1. Introduction

In food processing it requires more time and also requires more number of workers. It should be followed in a high precious manner. In many places there is a shortage of workers and require more place for the food processing. Sun light by which the panel will produce electrical current. However, be mindful that solar cells require bright and sunny weather to work at their optimum efficiency. The project aims in Design, Fabrication and analysis of Rice Vending Machine that would reduce manual work by automating the appliance. Converting the design dimensions into Computer Aided Design model, Assembly and part drawings. Designing and development of control circuits using microcontroller software and hardware. Fabricate and test the entire work for performance and review its results.

2. Design



A Cooking and dispatching position of cooker

B Loading position of cooker

1 Stepper motor

2 Leading screw for opening/closing of storage chamber

3 Converging unit

4 Storage tank opening and closing area

5 Electric cooker

6 Motor unit for lid opening and closing of cooker

7 Lead screw for lid opening and closing of cooker

8 Lid of cooker

Fig. 1. Schematic Diagram of Rice Vending Machine

The design of each parts of the rice vending machine are show in Fig. 2 below.

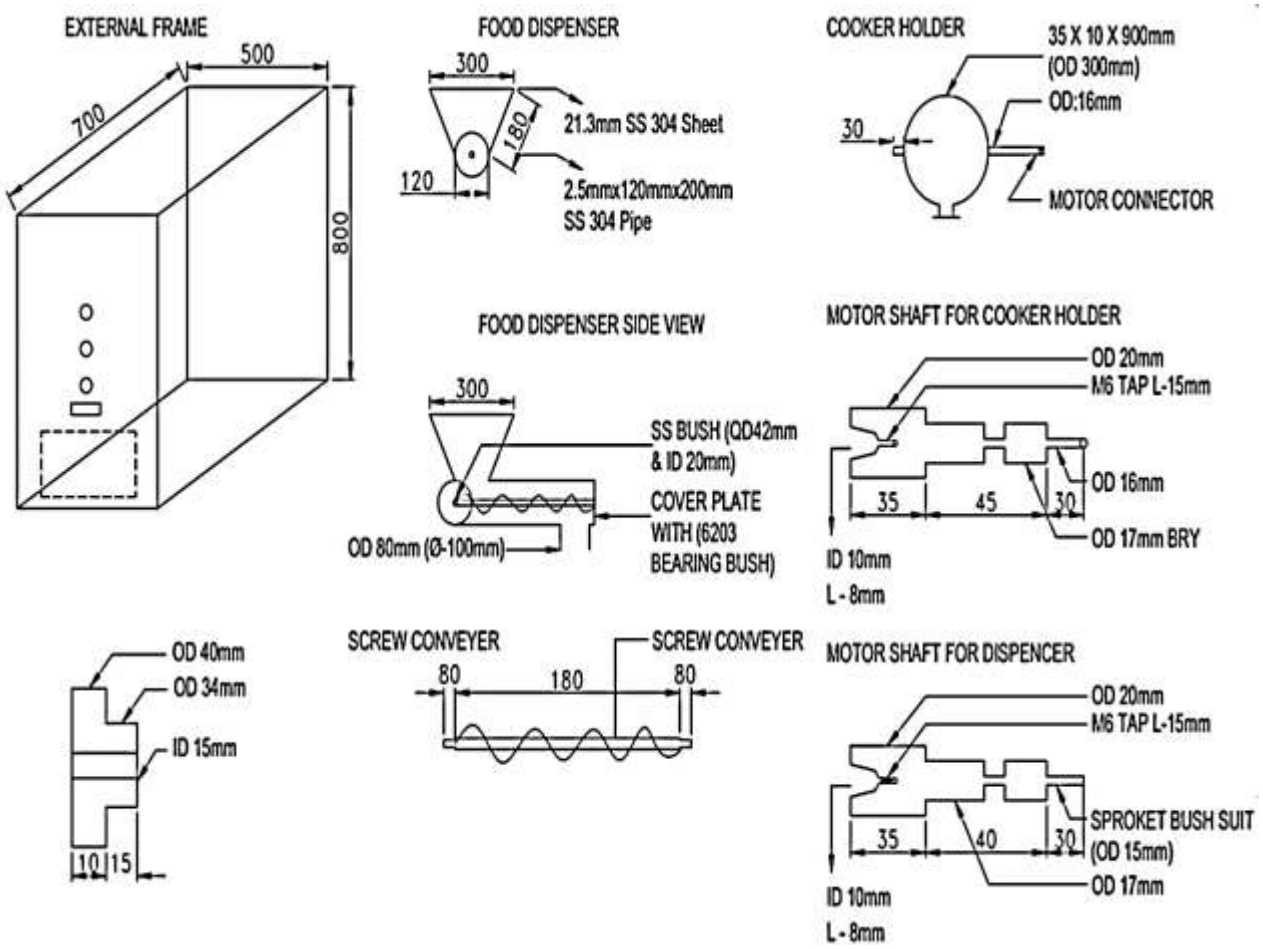


Fig. 2. Design of Rice Vending Machine Parts

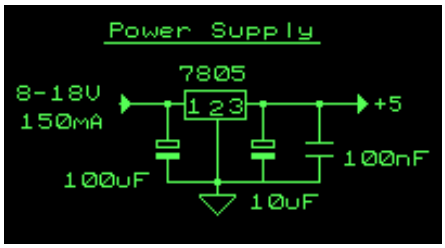
3. Working

1. The head reservoir consist of water and rice in a separate chamber according to their quantity of 50/100gms,in this step the controller diagnose the amount which vended by the customer ,and motor M1 controls the reservoir bottom door gets on and rotate opening towards the 50/100gm port. If it rotate left 50gm and if it rotate left 100gm level.
2. After the reservoir bottom door open. The below cooker door also open simultaneously. This door is controlled by the 12v dc gear motor M2.so the rice and required amount of water poured into the cooking chamber, After this the motor close the door automatically.
3. Then the microwave cooking chamber gets ON, it takes nearly 300sec to boil the rice.
4. Next the cooker is opened and inverted by the electric motor, so the boiled rice is poured in the rice bowl placed on the conveyor belt.
5. The rice-filled bowl on the conveyor belt is moved with the help of 12v dc motor, this bowl reach the outlet.

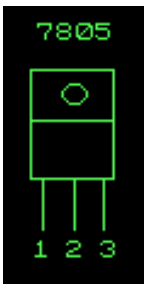
4. Circuit Description

This circuit is a small +5V power supply, which is useful when experimenting with digital electronics. Small inexpensive wall transformers with variable output voltage are available from any electronics shop and supermarket. Those transformers are easily available, but usually their voltage regulation is very poor, which makes then not very usable for digital circuit experimenter

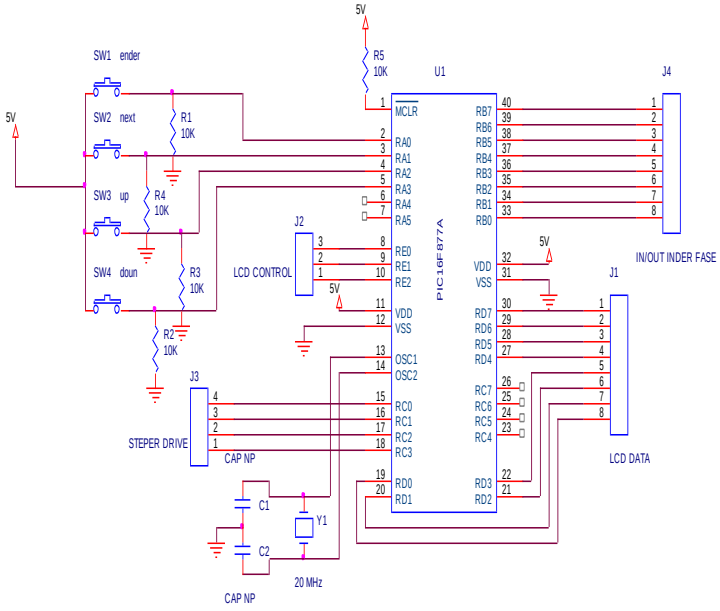
unless a better regulation can be achieved in some way. The following circuit is the answer to the problem. This circuit can give +5V output at about 150 mA current, but it can be increased to 1 A when good cooling is added to 7805 regulator chip. The circuit has over overload and terminal protection. The capacitors must have enough high voltage rating to safely handle the input voltage feed to circuit. The circuit is very easy to build for example into a piece of Vero board. The LCD Module can easily be used with a PIC microcontroller such as the PIC 16F877A included with the microcontroller beginner kit. The LCD Module comes with a 16 pin connector. This can be plugged into the breadboard as shown. This microcontroller circuit denotes about the connection between the various circuits like LCD display, stepper motor, and synchronous motor, coin interfacing circuit, in out interfacing, relay switches and various mechanical systems.



(a)



(b)



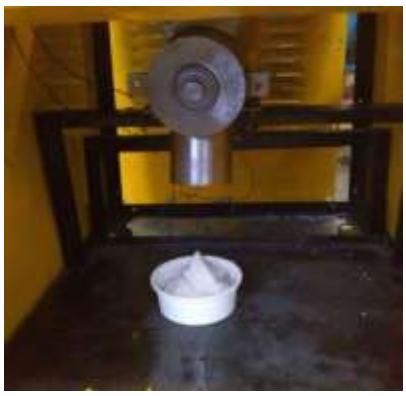
(c)

Fig. 3. (a) Power Supply (b) 7805 Pin Diagram (c) Microcontroller Circuit

5. Fabricated Rice Vending Machine

The fabricated model of rice vending machine is show below in Fig. 4.

(a)



(b)

Fig. 4. (a) Rice Vending Machine – Front View (b) Vending of Rice from Machine

6. Results and Graphs

The values of voltage, current and power in each operation of the machine are tabulated in below Table. 1 and graph is generated as shown in Fig. 5.

Table.1. Power Consumption Analysis

OPERATIONS	VOLTAGE(V)	CURRENT(I)	POWER(VI COSΦ=W)
Ideal	233	0.17	33.66
Rice filling	234	0.092	18.29
Water filling	234	0.155	30.82
Cooker moving	232	3.18	627.096
Lid closing	232	3.18	627.096
Cooking	230	3.11	608.005
Lid opening	235	0.164	32.759
Cooker moving	235	0.175	34.956
Tilting	233	0.175	34.658
Home position	235	0.83	177.77
Cos Φ = 0.85	**Average voltage =233.3**	**Average current =1.123**	**Total power =2225.10**

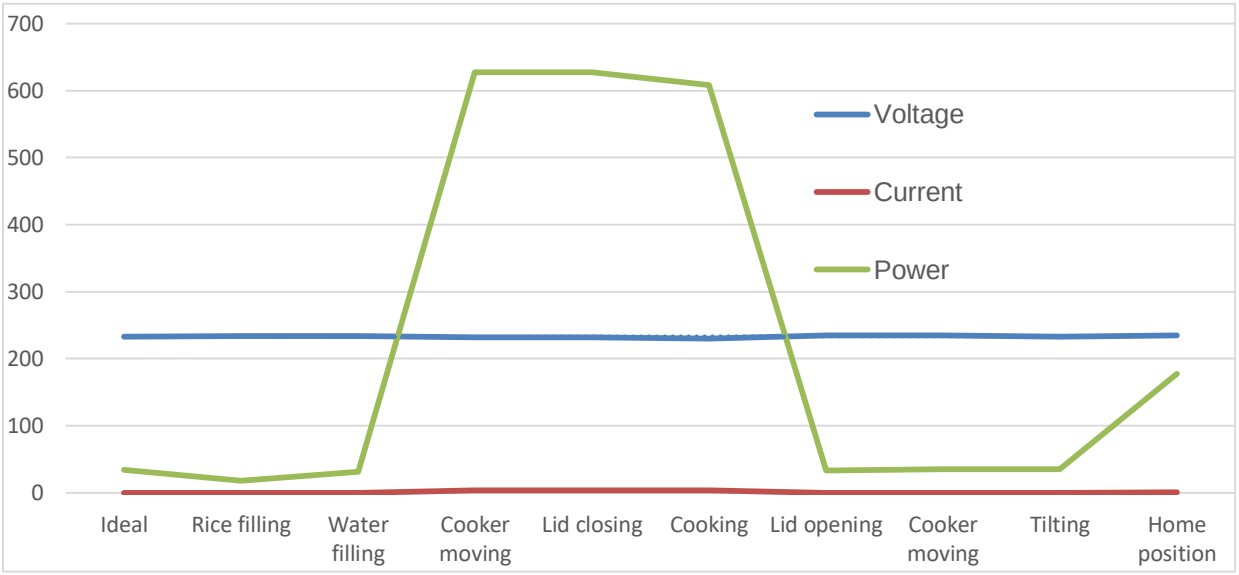


Fig. 5. Power Consumption Analysis Graph

7. Conclusion

Machines for vending boiled noodles, soup, beverages and ice cream were entered the market already. Still no machines were invented for cooking rice automatically. Thus, we produced a fully automated machine for cooking rice. This machine would find its applications in many hotels and functions. Thus we achieved the main objective of the project by producing the cooked rice by fully automated machine. We hope the project "Fabrication and Analysis of Rice Vending Machine" will find positive results from the users. Apart from cooking variety rice, analysis for bending of guide ways had been calculated. It produces very minimum bending and proves the machine is safe.

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