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SEMI-AUTOMATIC BOILED POTATO PEELING AND SMASHING MACHINE

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Abstract : *India is experiencing expansive growth in the fast-food sector. In most of the fast-foods, the use of boiled potatoes is seen in major quantity. But, the Potato peeling processes faces some numerous problems such as poor hygiene, more time consumption, etc. The main purpose of this paper deals with development of Peeling and smashing machine for boiled potatoes. The study of manufacturing is very important in order to carried out this project to ensure that everyone can understand on what are the needs to do and to help people easy to use. This paper involved the complete process of designing and fabrication of Boiled potato peeling and smashing machine using engineering concepts and marketing review. Methods and process involve in this paper like welding, perforating, shearing, cutting, drilling, riveting, etc. Generating a new concept of portable peeling and smashing machine for boiled potatoes is the main aim behind this paper. After all process had been done, this peeling machine may help us to understand the fabrication and designing process that involved in this paper.*

Keywords - *Cutting, Peeling, Perforating, Potato, Smashing*

I. INTRODUCTION

The traditional economic scenario of Indian society differed from that of modern situation. Majority of Indian consumers preferred to eat the home cooked food. Though, today the modern culture of dining out is rapidly changing the mind-set of Indian society. Now several fast-food brands have established its place in India, as they have powerful market in India due to current fast moving lifestyle, busy schedules, competition, increase in number of working women, nuclear family concept etc.

India is experiencing enormous growth in the fast-food sector. The growth in fast-food consumption is increasing day by day with urbanization, which shows modernization of India is on its way in food industry. In global production, the potato ranks fourth after wheat, maize and rice. It is second only to maize in terms of the number of countries that grow potato. Its importance as food is well recognized in European countries.

In the most of the countries, a large portion of potatoes is consumed in the processed form. Potato contains about 80 % water and 20 % dry matter. Starch is major portion of the dry matter. The starch content is (about 14 %) and the sugar content is about 2 % on fresh weight basis. The crude protein content of potato is 2 % and the fat content is 0.1 %. In addition, the potato contains fibres, vitamins and glycol alkaloids in small quantities. As India is most diverse country, so many food items are made from smashed potato such as vada pav, pav bhaji, sandwich, and many more. Hence, appropriate processing technology and equipment are essential to produce smashed potato in large quantity. Potato is an important crop in India. Both area and production has increased manifolds during the past decades. To sustain the increasing potato production, a closer look needs to be taken at the utilization of potato in our country. Almost all the potatoes produced in the country are utilized as human food. Allowing for about 10% used as seed and another about 15% lost at various stages, the per capita availability of potatoes in India is only about 15 kg/year. Processing could reduce losses due to spoilage. It has been estimated that about two to four million tons of potatoes are surplus in each of the two states of Uttar Pradesh and West Bengal. As to produced large quantity of smashed potato large human efforts are required and

maintain hygiene to overcome this a boiled peeling machine is design and fabricate to reduce the human efforts and to increase the production rate.[1]

II. LITERATURE REVIEW

Miss Siddhi Prashant Chitnis,2019, [2] conducted the study on Scenario of Fast-Food Industry in India. In this journal she studied and mentioned all the food trends, challenges faced by fast-food industries, effect of fast food on health in India. She also explained how fast-food industry is vastly growing in India and progress of business in fast food industries. From this journal, we learn about the how such problems rising in fast-food industries and we can overcome them. Hence, this paper is found as a very helpful for our research work.

Chirag D. Ajudiya, Nitin Jayakumar, Rahul Danger, Dr. Kartik D. Kothari, Vol-3, Issue-3, 2016, [3] review a research on forming process of perforated sheet metal. In this journal, they carried out detail study, material properties play an important role for forming process of perforated sheet metal. Due to material properties spring back effect also generated. Punch's nose radius is also playing a vital role for good quality product from the forming process. Blank holder Force expands grating and subsequently the required punch load. Subsequently, the clear holder power ought to be sufficient only to avert wrinkling of the spine. The edges of the punch and bite the dust are adjusted for the simple and smooth stream of metal.

III. PROBLEM STATEMENT

In all over World, most of the food items contain smashed boiled Potato. The Peeling and smashing of the boiled potato is not a quite difficult when we are considering it for 1-2 Kg Potatoes. But, the problem occurs when we do peeling and smashing for more than 40-45 Kg(Approx.) Potatoes. In Most of canteens and even in large hotels, this work is done manually which consumes more time and human efforts too. Also, taking cleanliness into account, we have decided to make such a machine that overcomes all these problems.

IV. METHODOLOGY

4.1. Objectives and Requirement

In growing industry sector, every firm wants an efficient and affordable model built with many advantage such as low man power, low setup cost, less maintenance and in easy to handle equipment/machines. Hence, considering all such requirements, we try to design such a machine that will fulfil all these requirements.

4.2. Design theory and Principle

The apparatus was design for peeling and smashing of boiled potatoes. The peeling action is done by putting the boiled potatoes on perforated sheet and pressing the potatoes under action of the piston which is attached to the main shaft of motor by a reciprocating mechanism. Designing play important role in any project work. Based on theoretical assumptions and certain assumed data, we build CAD model in solid works.

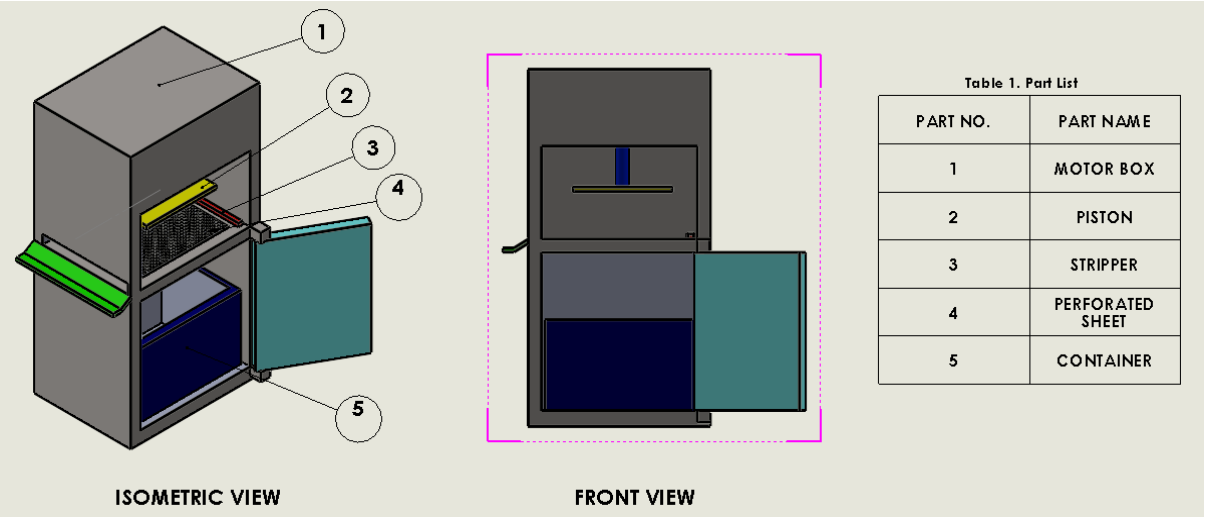

Table 1. Part List

PART NO.	PART NAME
1	MOTOR BOX
2	PISTON
3	STRIPPER
4	PERFORATED SHEET
5	CONTAINER

Fig.1 CAD Model

4.3. Working

Below block cycle shows the overview of the working.

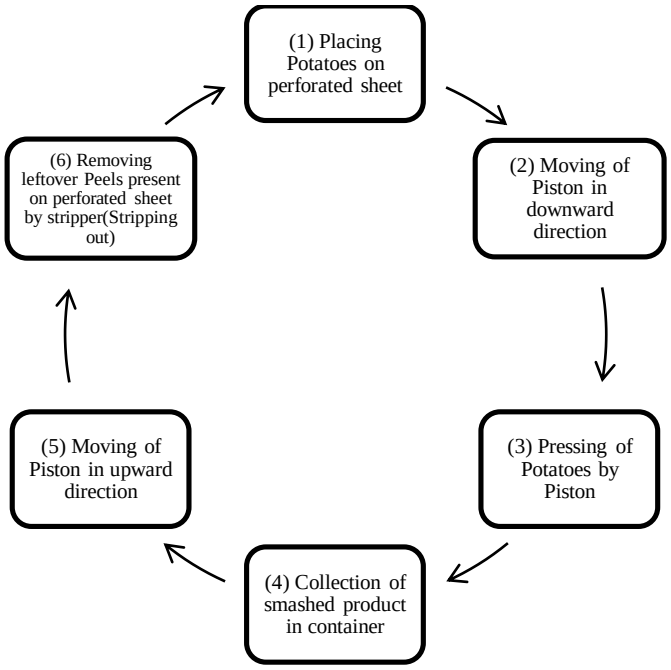

Fig 1.1

i. Initially, boil the selected quantity of potatoes and cut those boiled potatoes in such a way that maximum cross section area of the potato should face the perforated sheet as shown in fig.2. Since, maximum cross section area is in contact with perforated sheet, the amount of force required to smash down the potatoes is less. Now, place the half cut potato pieces as per requirement on the perforated sheet.

Fig.2. Cutting of potato

ii. Once the sheet is fed with the potato pieces, turn ON the machine.
iii. Now, the piston will start moving in downward direction and it will smash the boiled potatoes present on the perforated sheet.
iv. Due to this, the mash of the boiled potatoes gets collected inside the container.
v. Since, the piston has reciprocating motion, now it will start moving in upward direction.
vi. But, the peels of the potatoes remain on the perforated sheet. So, to remove those peels from the perforated sheet, stripper mechanism is used.

vii. Hence, the stripper removes all the peels and makes the perforated sheet free to place another pieces of boiled potatoes. Refer Fig.1.

V. CONCLUSION

In the overall process, taking objectives and problem statement into consideration, we start with literature review, in which we found the most of the information related to our project topic such as material, manufacturing processes, marketing value, etc. After reviewing all the collected data, we designed CAD Model for better understanding of Project model and its lookout. Then, we started working on design methodology which emphasizes the actual working stages we should follow to complete the project model includes survey of manufacturing of parts, assembly, testing, etc. This work indicated will be a good prospect for the design and fabrication of small machines/equipment which will serve as a best model for growing hotel industry and development of our country. At the end, we would like to say that this model will efficiently fulfill all the objectives and requirements.

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