



A Review - Design of Citrus Fruits Cleaning and Grading Machine

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ABSTRACT

In India the cultivation of citrus fruits is estimated around 924 thousand hectores area and the production is around 8607.7 thousand metric tons. As citrus fruits is produced on a large scale there arises a need of cleaning and grading of fruits in order to intensify the commercial value of the product. In India, the grading and cleaning of citrus fruit is carried out manually. Manual cleaning and grading consumes lot of time and also require lot of labour work. As per World Trade Organization (WTO) it is mandatory to sell high quality clean and graded products. So farmers are in search of a machine which can be economical, portable and easy to use; this will eliminate labour shortage and will save time and money. Cleaning is carried out by placing a set of cylindrical rollers in series; All this rollers are rotating in same direction. Rollers are made up of nylon and Polypropylene brushes. These brushes are used to remove dirt, dust and foreign material present on the citrus fruit. At another side of the machine a simple grading system having a tapered shaft is arranged which will separate down the fruits based on the size after cleaning and polishing. Size variations in citrus fruits provide a base for grading them into different categories.

Keywords : Citrus Fruits, Cleaning, Grading, Economic, Portable, Farmers.

I. INTRODUCTION

In India, agriculture is the main occupation and around 70% of the population is directly or indirectly engaged into this field. Beyond the conventional agriculture of fruits new technologies in horticulture have been recognized for changing the economic status of the farmers. In India horticulture contributes 12% and thus, and the importance of horticulture may not be ignored. The production of fruits at present is estimated around 96 million tonnes. In India, citrus fruit is produced in 0.62 million hector area with total production of 4.79 million tonnes. Citrus fruit industry in India is the third largest fruit industry of the country. India contributes 4% of the world's total orange production. Since there is a huge demand of citrus fruits in the market we are

designing a machine which will clean and grade the fruits without any artificial or harmful cleaning agent and without any human involvement.

Cleaning and grading of these fruits is considered very important as it can fetch higher price to the grower. This mthod will improve the packaging, handling and other pro-harvest operations. Cleaning operation is basically done in order to remove dust, dirt and foreign particles. The process of grading is basically segregating the fruits based on their size. Both the operations requires lot of time and manpower so, in order to minimize the time and energy we have designed a machine which can do cleaning, polishing and grading all in one single unit.

The machine is mainly related to agro sector where majority of farmers have to deal with the work of

cleaning, polishing and grading of the fruits. The cleaning operation is carried out in this machine by placing a set of cylindrical rollers in series, the rotation of this rollers are in same direction. The material selected for cleaning is nylon and polypropylene brushes, these brushes help in removing the dirt, dust and foreign particles. The next process which machine will perform is of polishing, where every manufacturer are making a machine which uses wax as the polishing agent, but here considering the health of people we are not using the artificial polishing agent. So for polishing we are introducing micro-fibre rollers which will help in getting the texture to the fruits. The final operation is of grading in which citrus according to their sizes are graded into different section. To perform this operation we have designed a tapered shaft which rotates at a certain speed. The design of the grading unit involves a tilted tray where sections are provided where the fruits after passing over the rollers collect on tray which is tilted at a certain angle, the tray passes the fruits over a shaft which is continuous in action those shafts are mounted over a frame. The fruits passing through the shaft will pass on further towards the collecting tray.

II. LITERATURE SURVEY

[1] The Paper Presented By J.L. Blogkbur'ger Published In The Year 1893. He has worked on orange or fruit cleaning machine, the objective of his invention is to provide a machine which will thoroughly clean and polish fruits or oranges and prepare them in excellent condition for the market at a minimum expenses of time and labor. His invention comprises a hemi-spherical brush having its bristles arranged pointing toward a common centre to form a concave brushing surface. The entire assemblies mounted on a frame for supporting purpose.

[2] The Paper Presented By Thomas S. Carswell, Kirkwood, Monsanto Chemical Company Published In The Year 1934. This invention is related to cleaning of fruits and vegetables, more importantly this invention is related to removal of spray residues from fruits and vegetables. The cleaning of fruits and vegetables is done by applying the dilute aqueous solution of an inorganic acid containing a small portion of alkali metal salt of a compound obtainable by reacting a sulphuric acid with the reaction product of an aliphatic alcohol and a di-phenyl compound.

[3] The Paper Presented By (1) Howard.C.Lisle, (2) James.W.Morse, Publication Of USA. They were worked on” Fruits and vegetables cleaning machine “ on May 25 1953 In which they was proposed to design a fruits and vegetable cleaning machine, incorporating fruits and vegetable polishing facility with this machine. This invention relates to a machine which uses a series of brush for the purpose of cleaning and polishing the fruits and vegetables. The apparatus of this application comprises it is also an object of the invention to provide a series of rollers arranged on a slighting a machine that will have means for reducing the 5-cline over which the fruit or vegetable is running at full capacity of the roller brushes. Mostly the number of steps and activities are intellectual and organizational rather than physical. Few organizations define and follow the precise development processes, where as the other organisation may not even be able to describe the processes.

[4] The Paper Presented By ERNEST H. WIEGAND In The Year 1930. The invention stated in this paper is related to fruit graders which has specific reference to novel methods and apparatus. The fruits such as oranges, prunes, lemons, etc are separated into quality grades by floatation according to their density and maturity. In this invention he has used solutions of

greater density than water for separating fruits into their respective quality and grades. The solution used are sucrose, glucose, laevulose, maltose, sodium chloride etc. The fresh fruits will float on the surface of the solution whereas the ripped fruits sink at the bottom. This machine consists of a tank in series, containing solutions of greater density than the density of the water/aqua.

[5] The Paper Presented By W.W. Jacobs Dated 17.1901 They were design a Cleaning and grading machine for oranges of various sizes maybe thoroughly brushed and cleaned afterwards graded accordingly and delivered into separate hopper or bins provided for their reception. During the design of this machine they had taken into consideration that it should be more efficient than the manual operation and should minimise the difficulty existing in the conventional one. The rail is arranged to collect the oranges which pass through the way or passage between the guard brushes, another rail is arranged to carry away the oranges which are removed by hand from the wheel and are placed on the periphery of the wheel against the rail. If there is a case of breakage and removal of waste, there is a loss of man power, thus a tremendous modification is required in this area of design which increase the advancement of the technology.

[6] The Paper is Presented By Alfred Ayer In 1890. It states that important object in grading the oranges is to secure the exact lying of standard boxes with oranges of either size delivered by the machine. This end is not reached by the use of machines that grade by weight or that passes the fruit through long slots, for weight and size do not vary together, and a large orange, will pass through a narrow slot and for analogous reasons, but when the fruit is graded by passing through circular openings and the desired

result is obtained with the greatest certainty and the box gets filled.

III. CONCLUSION

Hence by referring these papers we have concluded that:

The Cleaning, polishing and grading operations can be done by a single unit without any involvement of human. Machine should also prevent health hazards. Any chemical or polishing agents should not be used. The construction of machine should be compact and portable in order to minimize the floor area. Machine should require Low maintenance and easy mechanism. This machine must be completely automatic so as to save time, money and manpower. Affordable machine should be provided to a farmer. The machine should be simple and easy to handle.

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