

Fabrication of Multi-Purpose Grating Machine

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Abstract- A grating is an important operation especially to make a salad and for decoration purpose. A suitable grating material is needed for particular decoration process. It is critical for food (processing) industry to operate at minimal operating cost. The traditional method of grating the fruits and vegetable is very time-consuming, unhygienic, tedious, and less efficient. There is need to upgrade the traditional method of a grating, so we introduce the mechanization of grating operation. This paper presents the fabrication of the mechanized grating machine. This machine was driven by the motor which sends the rotary motion to the grating blade/assembly through V-belt and shaft. It was made to accept fruits and vegetables through the hopper to the grater assembly, in which the grating sieve is rotating and ready for grating the input material.

Keywords- Grating, Multipurpose, Less Time-Consuming, Domestic Grater, Fruits And Vegetable, Light-Weight, small size.

I. INTRODUCTION

The grating of fruits or vegetables is important to obtain the finely shredded products. In the current market, graters come in various shapes and sizes and each grater has several different blades. Selection of the proper size of blade for the specific purpose is an important task. Large round holes work the best, however smaller the hole, the finer the end result/product. The finest side is used for grating and should be used on firm or hard uneven food. Currently, available grater design in the market is a box grater that has four sides with openings of different sizes and shapes on each side. The flat grater is a good choice for shredding directly onto a casserole or salad. A flat or curve grater with rows of small cutting edges on the surface is the widely known type of grater. This grater generally has a metal surface punched with sharp-edged holes that are used to break foods into smaller pieces. Available grater in the market that specifically used for fruits and vegetables normally handled manually using hands which tedious and time-consuming.

Our machine is kind of a rotary grater in which the grating blade/sieve is rotating and the rotating material is feed over it through the hopper. The machine is driven by the 0.25HP 1Ph motor, the grating assembly is mounted on the

one end of the shaft on that shaft the pulley is fixed which get the input power from the motor through V-Belt which connect the motor pulley and grater shaft pulley. This Machine makes the grating safer, as the material is put through hopper away from the grating blade different from the manual grating where the distance between the blade-material-hand is very less and chances of the hand get injured.

II. LITERATURE SURVEY

There are a different method of the grating for the different types of products like coconut, cucumber, radish, etc. there is no any machine in which all the fruits and vegetable are grated, so we are fabricating the machine which can grate most of the fruits and vegetables. The surveying of the literature regarding the ecosystem are listed below.

M.K. Siti Mazlina, A.R. Nur Aliaa, H. Nor Hidayati, M.S. Intan Shaidatul Shima and W.H. Wan Zuha, (1) design and development of a multipurpose machine for a grating and peeling of fruits and vegetables in order to reduce the time required for the operation. Grating using hands is time-consuming and may require several workers to perform the operation and thus may increase the operating cost. Their machine was designed in such a way that they can do combine operation of grating and peeling in one device. This newly designed machine is suitable to be used domestically. Their prototype was able to grate several fruits and vegetables due to which time required for the operation is get reduce.

Abubakar Mohammed, Abdulkadir B. Hassan, Katsina C. Bala, Abdulkarim Nasir, Olawale J. Okegbile, Dele S. Jimoh, (2) fabricate and perform the evaluation for pulverizing and sieving machine for dewatered grated cassava which is driven by the pedal. This paper presents the fabrication and performance evaluation of a pedal-driven pulverizing and sieving machine for dewatered grated cassava. The machine was designed in such a way that the rotary motion of the motor, which is then transferred to sieve for the grating operation. In this machine, the grating operation is carried out by the rotary motion.

Abin Shaji , Basil Chandy , Jerry James, Jacqwin Joy, Vinay Mathew John, (3) design & fabrication of coconut breaker extractor grater machine, The proposed machine a

coconut breaker, extractor, grater which can break a de-husked coconut into two pieces, collect coconut water and grate the coconut pieces into desiccated coconut. The main highlight of the proposed project is that there is no contact between the tool and hands of the user both in breaking and grating of the coconut.

III. COMPONENTS & SPECIFICATION

Components:

In a multi-purpose grating machine, the main components are Pulley, Motor, V-Belt, Various types of Sieves, Casing, Hopper, Collecting Pan, Frame.

Pulley: There are two pulleys basically one is smaller motor pulley which is driver pulley and other is bigger pulley which is driven pulley on which v-belt is mount.

Motor: 0.25 HP motor is attached to driver pulley.

V-belts: The V-belt gives more efficiency than a flat belt. It connects driver and a driven pulley.

Collecting Pan: To collect the grated material.

Hopper: The material is fed through this portion of the machine.

Frame: The basic part, and very rigid construction because all the parts are mounted on the frame. The dimension of frame is 620 x 620mm and 460 x 460mm at the bottom and top respectively and the height between both frames is 760mm.

Bearing: There are 2 bearing 1inch bearing which is mounted on the frame and support the shaft

Specification:

Motor = 0.25 HP, 50 Hz, 2-8A, 220/230V

Single Phase AC Motor

Speed = 1425 rpm

Driver pulley = 101.6 mm

Driven pulley = 203.2 mm

Centre distance = 640 mm

Shaft diameter = 25 mm

Shaft Length = 609 mm

Upper side of frame = 457 mm

Lower side of frame = 609 mm

Height of frame = 760 mm

Material used = Mild steel, Tin sheet

Bearing = Deep groove ball bearing

Internal dia. = 25.4 mm

Outer dia. = 47 mm

Width dia. = 12 mm

IV. CONSTRUCTION & WORKING

Construction:

The motor is mounted on the bottom of the frame, which is bolted to the frame. On the motor shaft, the pulley of 101.6mm is mounted, called as the driver pulley. Now on the top side of the frame, shaft of 25mm diameter & 609 mm long is mounted which is supported by the two bearing positioned/mounted on the upper side of the frame, each bearing is of 25 mm internal diameter. At one end of the shaft, the grating assembly is mounted. On the same shaft, the pulley of diameter 203.2 mm is mounted, which is called as a driven pulley. Both the driver and driven pulley are connected by the V-belt, which transmit the rotary motion of the motor to the grate assembly.

Working:

Firstly we have to choose the appropriate sieve of desired hole size. Then fixed the sieve on cylindrical type drum which is mounted on the shaft which acts as support and fixture for sieve and then plugs the machine into the power supply. When we switch on the machine, the motor at the bottom of the setup starts rotating and thus the shaft of the motor starts rotating, on which driver pulley is fixed. On the driver pulley, the V-belt is mount which transmits the



Figure 1. Motor



Figure 2. Gratter Assembly

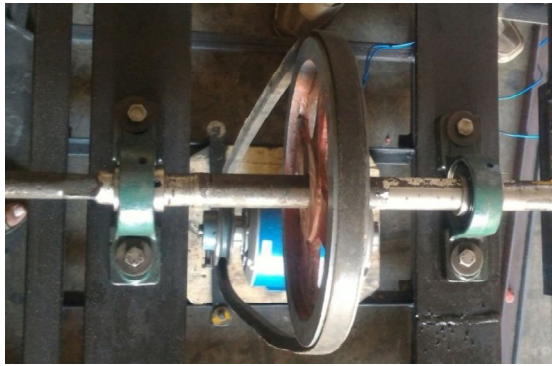


Figure 3. Top view of the assembly

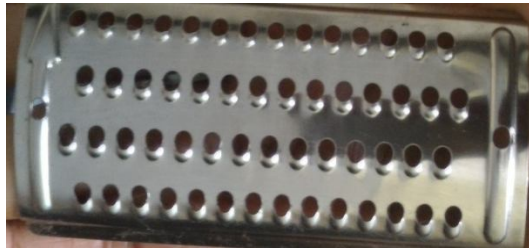


Figure 4. Sieve

motion of the motor to driven pulley then pulley to the shaft and finally to the grating assembly. Now put the grating material in the hopper and press the grating material against rotating drum by using the wooden rod. Press the grating material until the whole material is grate/ pulverized. And finally, collect the grated material in collecting pan. From exit/discharge side of the grater. And use it for the required purpose.

V. ADVANTAGES

- This Machine makes the grating safer, as the material is put through hopper away from the grating blade different from the manual grating where the distance between the blade-material-hand is very less and chances of the hand get injured.
- Easy to install anywhere as the size of the machine is small and compact
- Simple in construction.
- Easy to operate.
- Useful for multiple fruits and vegetables
- It reduces time and effort of the worker
- It will be very useful in conducting large functions such as marriages, hotels.

VI. CONCLUSION

The fabrication of multipurpose grater machine was done and discovered to be a simple and easy machine to

operate, the machine is very economical and feasible for domestic application.

VII. ACKNOWLEDGMENT

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