

Design of High Accuracy Incense Stick Making Machine

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Abstract-Incense sticks called agarbattis in India, are becoming internationally known as a ritual product used for spiritual purpose producing fragrance for aromatherapy and meditation. The agarbatti workers in India lack efficient tools and education to develop better means of processing agarbattis. The current manual mixing processes are physically exhausting and time demanding to complete. In order to help agarbatti producers, this project focuses on providing a better means of mixing the raw materials involving in making incense sticks. In-depth study was carried out using several methodologies including personal interview, observation, and site visit. The data was collected and analyzed using QFD, to select the characteristics of mix, types of materials, manufacturing processes and ergonomic issues involved. In addition easy of manufacturability, cost consideration and safety factors were considered while designing the machine, and PDS was arrived upon. The final concept was selected by participatory and weighted ranking method to show the problems faced by the manual labours in this industry.

Keywords-incense sticks ,agarbatti .

I. INTRODUCTION

The system we designed is a design and fabrication of incense stick making machine. India is a vast country and the Indian people follow various religions, speak different languages and follow different customs and traditions. In spite of this diversity, all people use agarbatti (Incense sticks) at all the places of worship, religious functions, festive occasions, weddings. This itself speaks volumes of the high importance agarbatti has. The burning incense in religious and social functions has been practised in India since early times. The demand for agarbatti is increasing. A motorcycle side stand is nearly universal method of allowing a motorcycle rider to park his vehicle easily. If this stand is in the park position while the motorcycle is ridden through left turn a serious hazard exists. A new type stand side stand which is automatically side stand is invented to prevent such type of accidents.

both in the domestic and export markets because of the improvement in quality and increase in the types of products. About 75% of the agarbatties manufactured are of cheap quality containing only charcoal powder or low quality sandal wood powder with a mixture of 50% of wood gum powder. Cheap perfumes are used to give them a top note. In superior varieties, essential oils, purified resins, natural fixatives like amber, musk and civet is used along with synthetic aromatics. Absolutes are used in the costlier types.

The Development And Fabrication of multi-purpose incense stick making machine to alleviate the labor intensive work associated with the production of bamboo-cored incense sticks is the main purpose of this paper. The machine is based on the mechanism of extruding the stick paste over the bamboo sticks.

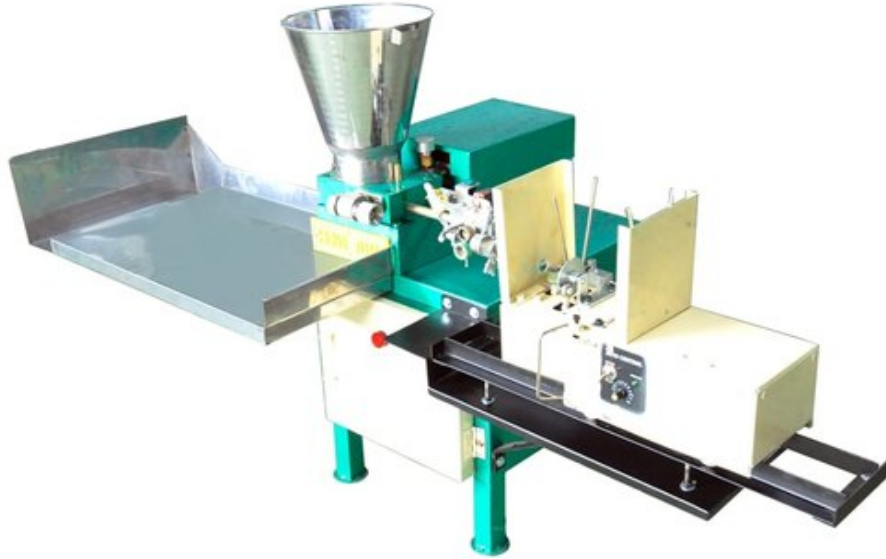


Fig.1- Overview of designed project

II OBJECTIVE

The main objective of our project is to prepare incense stick making machine which gives employment to the people in rural area. The fabrication cost of our machine is way cheaper than the other automatic incense stick making machine available in the market. The quality of incense-sticks, various cross-sectional shapes and length that can be produced by the machine cannot be achieved manually.

III SCOPE OF PROJECT

Due to the demand of incense sticks in the daily use there is a good scope for fabrication and marketing of incense sticks. The fabrication of the machine is done in such a way that it can be easily portable from one place to other and compact in size. So that our fabrication model will help full to the small as well as the medium scale industries around the country. This machine can be used in small villages of India where people can work from home.

IV COMPONENTS

- DC motor
- Ultrasonic sensor
- Piston set
- Rocket, Nozzle, Die
- Sweeping blade
- Feeder disc

4.1 DC MOTOR

DC motors consist of one set of coils, called armature winding, inside another set of coils or a set of permanent magnets, called the stator. Applying a voltage to the coils produces a torque in the armature, resulting in motion. The efficiency increases rapidly in the beginning, reaches its maximum value and then decreases.



Fig.2- DC motor

4.2 ULTRASONIC SENSOR

Ultrasonic detection is most commonly used in industrial applications to detect hidden tracks, discontinuities in metals, composites, plastics, ceramics, and for water level detection. For this purpose the laws of physics which are indicating the propagation of sound waves through solid materials have been used since ultrasonic sensors using sound instead of light for detection. An optical sensor has a transmitter and receiver, whereas an ultrasonic sensor use a single ultrasonic element for both emission and reception. In a reflective model ultrasonic sensor, a single oscillator emits and receives ultrasonic waves alternately.



Fig.3-Ultrasonic sensor

4.3 PISTON SET

Piston set is an important tool to apply powder mix up on the incense stick surface. Through using high hydraulic pressure of the piston arrangement, powder mixer drawn by the nozzle setup. While the signal is obtained from the ultrasonic sensor then the motor starts to rotate and then the piston arrangement along with the shaft also starts to rotate.



Fig.4-Piston set

4.4 ROCKET, NOZZLE, DIE

Rocket is a round shaped sharp edged metallic part that used to insert the incense stick .where approximately 3mm incense sticks are used and the nozzle at the another end to apply the powder mixer on the surface of the sticks. The rocket and the nozzle are covered with a setup called as die, which bring the equal pressure on the both sides.



Fig.5-Rocket, Nozzle, Die

4.5 SWEEPING BLADE

Sweeping blade placed center portion of the piston arrangement and it will be covered with the powder mixer. When the machine starts to work then the stick sensed and the piston is starts to move and takes small amount of powder towards nozzle. The blade seems like “V” shaped metal.



Fig.6-Sweeping blade

4.6 FEEDER DISC

Feeder disc is used to fetch the incense stick separately from the bundle of sticks. This portion is connected at the end of automatic incense stick feeder. When the feeder starts to work as per the speed adjustment the stick will be taken one by one. The flow of sticks will be controlled by using speed adjustment provided along with automatic incense stick feeder.



Fig.7-Feeder disc

V OPERATION OF DESIGNED MODEL

Incense stick machine works on principle of extrusion, chain and sprocket, rack and pinion. The machine includes the nozzle which is very important part in our machine. Then Nozzle is the where extrusion takes place. In this extrusion process the semi-solid incense powder gets adhered to the bamboo stick coming from the circular hole present. Above the nozzle there is a vertical cylinder where the semi-solid incense powder is put in. This cylinder is then fitted with piston which reciprocates vertically in the cylinder. Force put to the piston is then acted on the semi-solid incense powder which rushes into the spaces present inside the nozzle. The cylinder is perpendicular to the nozzle hence the semi-solid incense powder moves all around the nozzle of circumference of it. The semi-solid incense powder from the circumference moves into the convergent part of the nozzle which in turn moves into the gap present into the hole from where the bamboo stick comes into the nozzle. The bamboo stick is first inserted in and then the force is applied since there must be no wastage of the semi-solid incense powder. This semi solid incense powder moves tangentially to the bamboo stick. Hence the force from the powder is applied to the stick and stick moves forward.

5.1 PISTON MOVEMENT

Piston calibration is the main think to make a continuous flow incense sticks towards the nozzle and rocket setup. From this the external force can be created through the rotation of motor shaft which is connected along with the piston valve. Where the piston force is very important to suck the incense stick inside the die setup as well as through out after finishing of Agarbatti powder over the incense stick surface.

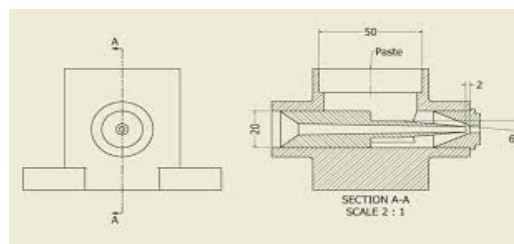


Fig.8-piston movement

Thus the cylindrical structure of the nozzle towards the rocket is to make powder setup in the continuous 3mm diameter flow. Horizontal arrangement of the piston from the feeder disc makes straight suction of the incense bamboo stick on by one continuously. That will be a most important thing to maintain the overall hydraulic pressure on the incense stick suction and rejection. Where total time period for fixing the incense powder on the incense stick surface is based on its piston pressure.

5.2 AUTOMATIC INCENSE STICK FEEDER OPERATION

Automatic incense stick feeder contains of a roller set, speed control switch, feeder disc and then total switch. Thus feeder control is totally accessed by the DC gear motor. Purpose of installing the gear motor is to

make one by one fetching of bamboo sticks towards the nozzle. Total speed is based on the piston rotation and the outlet of powder mixer. Initially the bamboo sticks are placed on the feeder slots and the feeder disc is supplied.

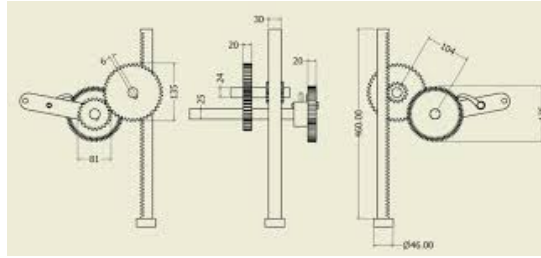


Fig.9-automatic incense stick feeder operation

Feeder arrangement is placed nearer to the powder mixing funnel and below that the piston arrangement is provided. From this automatic incense stick feeder fetch sticks one by one. All the operations are controlled by the ultrasonic sensor provided above the feeder roll bearings. Sensor senses the incoming incense sticks and the starts to rotate the piston for pushing the powder mixer towards outside. That powder mixer is makes small pieces of placing over the incense stick surface and then the stick is comes out from the die setup. Where piston set totally controlled by sensor signal.

VI ADVANTAGES

- High accuracy
- Safe and hygiene
- Low time period
- No need of man power
- High Employment opportunities

VII DISADVANTAGES

- High capital cost
- Need of electrical energy

IX CONCLUSION AND FUTURE SCOPE

The main objective of our project is to prepare incense stick making machine which gives employment to the people in rural area. The fabrication cost of our machine is way cheaper than the other automatic incense stick making machine available in the market. The quality of incense-sticks, various cross-sectional shapes and length that can be produced by the machine cannot be achieved manually. Also the uniformity of the incense stick along with its incense powder can be maintained for the entire action. Due to the demand of incense sticks in the daily use there is a good scope for fabrication and marketing of incense sticks. The fabrication of the machine is done in such a way that it can be easily portable from one place to other and compact in size. So that our fabrication model will help full to the small as well as the medium scale industries around the country. This machine can be used in small villages of India where people can works from home.

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