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SEMI AUTOMATED FUMIGATOUR

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ABSTRACT This abstract presents an overview of the design and functionality of a semiautomated fumigation system developed for precision pest control in agricultural and food processing environments. In response to the increasing demand for sustainable and effective pest management, this semi-automated fumigator integrates cutting-edge technology to streamline the fumigation process. The system incorporates a spinner for uniform spice distribution, a bright light attractant for insects, and a targeted chemical fumigation mechanism.The spinner ensures the even distribution of spices, optimizing the exposure of pests to the subsequent fumigation process. As the spices traverse the system, a strategically positioned bright light attracts insects towards a designated area. Once attracted, a carefully selected chemical fumigant is released, efficiently targeting and neutralizing pests. The semiautomated nature of the machine allows for enhanced control over the fumigation process, minimizing human intervention and reducing operational complexities.

I. INTRODUCTION

In the realm of modern pest control for spice processing, semiautomated fumigatour has emerged as an innovative and efficient solution. This method involves the use of automated machines designed specifically for the controlled release of fumigants, ensuring the effective elimination of insects and pests that may compromise the quality and safety of spice products. Spice processing industries face significant challenges in maintaining the integrity of their products, as pests and insects can cause considerable damage during various stages of production and storage. Traditional fumigation methods often require significant manual labor and may pose safety risks to workers. Semiautomated fumigatour addresses these concerns by combining the precision of automation with the expertise of human control. Semiautomated fumigatour relies on purpose- built machines equipped with advanced control systems. These machines are designed to efficiently disperse fumigants in a controlled manner, ensuring thorough coverage of the spice processing facility. By minimizing manual labor and optimizing fumigant usage, semiautomated fumigatour can lead to cost savings in the long run. The automation aspect not only enhances the precision of the fumigation process but also minimizes human exposure to potentially harmful chemicals. Semiautomated fumigatour machines offer precise control over the release of fumigants, allowing for targeted treatment in specific areas without overexposing the spices to the chemicals. Semiautomated fumigatour represents a leap forward in pest control for spice processing, the advantages of automation with the need for precision and safety. As the spice industry continues to evolve, embracing innovative technologies like semiautomated fumigatour will play a pivotal role in ensuring the consistent production of high-quality, pest-free spice products

II. LITERATURE SURVEY

In laying the groundwork for semiautomated fumigatour a thorough exploration of existing literature was undertaken to gain insights, identify gaps, and build a foundation for our work.The literature survey encapsulates a wide range of studies and works relevant to Automotive sector.

P.S. Shanmugam et al. (1) - Turmeric is being cultivated in area of 46,000 hectares with the production of 1.74 lakh tonnesin Tamil Nadu.Tamil Nadu contributes 13 per cent of Indian

H. S. Grover et al. (2) - Traditionally known for its anti- inflammatory effects, C. longa has a long history of the curative use in the Ayurvedic and Chinese systems of medicine.

S Devasahayam et al. (3) - Pest management strategies involving the use of relatively nontoxic and selective proceduresthat preserve ecological health and minimize negative effects on beneficial insects, and utilize microbial pathogens and their products, plant natural products M. Sunil Kumar et al. (4) - Turmeric is a popular spice worldwide due to its wide range of applications in food, cosmetic and pharmaceutical industry

Uzair Muhammad et al.(5) - The use of synthetic pesticides to control pests and increase crop yield is a common practice,but they cause several environmental and health problems.

Bappa Ghosh et al. (6) - In turmeric, we experienced an unsatisfactory method performance (poor recovery) for several compounds. These included bromopropylate, chlorpyrifos methyl,dichlobenil, ethoxyquin, fenitrothion, fenthion, propyzamide, trifluranil, and many others.

R.Arutselvi et al. (7) - Entomopathogenic fungi have great potential in pest management due to their mode of action, specificity and cost efficiency

Lithi U.J et al. (8) - The extracts were tested at the concentrations of 2%, 3%, 5% for turmeric . Repellency rate of Dermestes sp., adults was highest, where larvae showed mere resistance against herbal pesticides

Chengala Laxmishree et al. (9) - Pest management is one of the essential components in theagriculture. Conventional pesticides caused various environmental issue.

III. PROBLEM STATEMET

The current process of fumigating spices for pest control involves manual labor and traditional methods, which can be time-consuming, inefficient, and may not guarantee thorough insect eradication. To address these challenges, there is a need for the development of a semiautomated fumigation machine designed specifically for the spice industry. This machine should aim to enhance the efficiency, precision, and safety of the fumigation process, ensuring the elimination of pests while minimizing the impact on the quality of the spices. FIGURE 3.1 – PEST CONTROL IN WAREHOUSE Manual Labor and Time- Consuming Process: The existing manual fumigation processes for spices involve significant human labor, leading to increased operational costs and time consumption. Lack of automation results in lower productivity and may hinder the scalability of spice processing facilities. Inconsistent Fumigation Efficacy: Traditional fumigation methods may not uniformly reach all parts of the spice batches, leading to inconsistent results in pest control. Inadequate fumigation could result in pest resurgence and compromise the quality of the final spice products. 13 14 Safety Concerns for Workers: The use of chemical fumigants poses potential health risks to workers involved in the manual fumigation process. Automating the fumigation process can reduce human exposure to hazardous substances and enhance overall workplace safety. Quality Assurance: Maintaining the quality and integrity of spice products is crucial. Any damage to the spices during the fumigation process can impact their market value and consumer acceptance. The new fumigation solution should ensure that it effectively eliminates pests without compromising the sensory and nutritional attributes of the spices. Regulatory Compliance: Adherence to national and international regulations regarding fumigation practices and chemical usage is essential. The semi-automated fumigation machine should be designed to comply with relevant regulatory standards and guidelines. Integration with Existing Processes: The new fumigation solution should seamlessly integrate with existing spice processing workflows and infrastructure. Compatibility with various types of spices, batch sizes, and processing equipment is crucial for widespread adoption. By addressing these challenges, the development of a semi- automated fumigation machine for the spice industry can significantly improve efficiency, consistency, and safety in pest control processes, ultimately enhancing the quality of spice products.

IV. MATERIALS

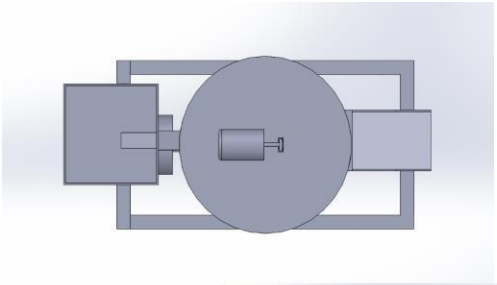
AISI 316 STAINLESS STEEL

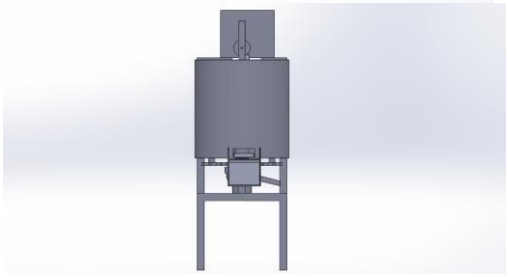
AISI 316 stainless steel, also known as marine grade stainless steel, is a widely used and versatile

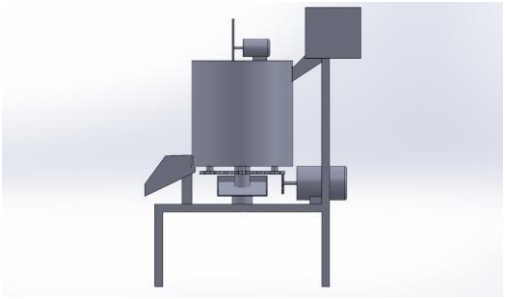
material known for its corrosion resistance and excellent mechanical properties. Here are some key properties of AISI 316 stainless steel. Corrosion Resistance: AISI 316 offers outstanding corrosion resistance, particularly in environments containing chlorides and other aggressive substances.It is highly resistant to corrosion in both acidic and alkaline conditions. Temperature Resistance: AISI 316 maintains its mechanical properties at both high and low temperatures, making it suitable for a wide range of application .It exhibits good heat resistance and is suitable for use in elevated temperature applications. Weldability: AISI 316 stainless steel is generally weldable using common welding techniques. Post-weld annealing may be required to restore corrosion resistance in the heat-affected zones.

Fabrication: AISI 316 is easy to fabricate and can be formed using standard processes such as bending, drawing, and deep drawing. It is also machinable, although it may require slower speeds and lower feed rates compared to carbon steels. Cleanability and Hygiene: AISI 316 is easy to clean and maintain, making it suitable for applications where hygiene is critical, such as in the food and pharmaceutical industries. Applications: Commonly used in marine environments, chemical processing, food and beverage processing, pharmaceuticals, medical devices, and various industrial applications where corrosion resistance is essential.AISI 316 stainless steel is a premium material known for its durability, corrosion resistance, and versatility, making it a popular choice in demanding applications across different industries.

V. DESIGN







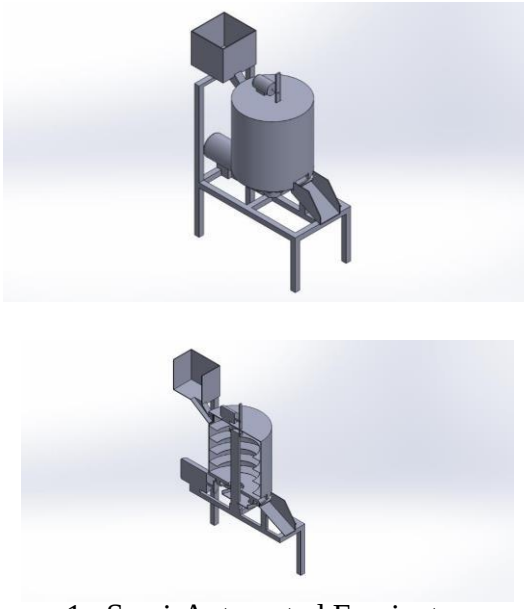


Figure 1 : Semi-Automated Fumigatour

VI. WORKING PROCESS

Here's a step-by-step breakdown of the process Spices are loaded into the system, and they pass through a spinner. The spinner's primary function is to evenly distribute the spices, ensuring uniform exposure to the fumigation process After passing through the spinner, the spices move to an area where there is a bright light. This bright light is designed to attract insects that might be present in the spices. Insects are naturally drawn towards the bright light. This process is based on the principle that many insects are attracted to light sources. Once the insects are attracted to the light, a chemical fumigant is released or sprayed onto the spices. The fumigant is a substance designed to eliminate or control pests, including insects, bacteria, or fungi. The chemical fumigant works to kill or eliminate the targeted pests. The duration of the fumigation process may vary depending on the type of pests being targeted and the specific chemical used. After the fumigation process is complete, there may be a stage where the spices are allowed to undergo ventilation or drying. This step is crucial to remove any residual fumigant and ensure the The working process of a semi- automated fumigator, as you've described, involves several spices are safe for consumption. The treated spices undergo quality control checks to ensure that the fumigation process has been effective and that the spices meet the required safety and quality standards.

VII. CONCLUSION

In conclusion, the implementation of semi-automated or fully automated fumigation machines designed for insect control represents a significant advancement in pest management strategies. The utilization of such technology offers numerous benefits that contribute to more efficient and effective pest control measures. Firstly, semi-automated and automated fumigation machines reduce the reliance on manual labor, leading to increased productivity and cost-effectiveness. These machines are capable of covering larger areas in a shorter time, ensuring a more comprehensive and consistent application of fumigants.Secondly, automation minimizes the potential risks associated with human exposure to fumigants, enhancing overall safety for both operators and residents in the treated areas. With precise control over dosage and application, the risk of overexposure or underexposure is significantly reduced.Furthermore, the use of automated fumigation machines allows for better control and monitoring of environmental conditions during the process. This ensures that fumigants are applied under optimal conditions, maximizing their efficacy while minimizing any adverse effects on non-target organisms and the surrounding ecosystem.

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