JETIR.ORG | ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

DESIGN AND FABRICATION OF PRAWN CLEANING MACHINE

[1]Md Ali Hyeder, [2]Arun Sah, [3]Mohiuddin Sohan, [4]Raju Pandey, [5]Krishan Narayan Yadav
[*]Er. Lakhwinder Singh, *Er. Hemant Singh
[1]Student, [2]Student, [3]Student, [4]Student, [5]Student, [*]Assistant Professor
[1]Department of Mechanical Engineering,
[1]Gulzar Group of Institutions, Khanna, Ludhiana, Punjab, India

ABSTRACT

In the current time of technology with the increasing consumer demand, mechanized Prawn production has become more and more popular for its high efficiency and much less Garbage, less bacterial infection, in particular, the removal of shells and veins plays an important role to guarantee clean production in the Prawn or shrimp processing.

There are several kinds of machines which can achieve the required function worldwide up to now. Among these machines, the machine featured with a rotary sieve & Vibration sieve has significant advantages, if compared with others. Guarantee clean production in the Prawn processing.

This machine is easily used in fisher ships. Thus, the structure and the development process about it were summarized in this paper. Through the summary, the advances of this machine were outlined in detail, and the future research direction of the industry of prawn/shrimp cleaning machines was also indicated, that is the mechanical structure to be optimized, simplified & Cost reduced. Meanwhile, if an advanced electric automatic control system is introduced, the labor cost would be significantly reduced; reducing the suffering of fishermen, and the production quality, productivity, and efficiency would be enhanced.

Index Terms: **Prawn or Shrimp, Water cleaning, hygienic, Vibration, Rolling, Drying, Motor, Ac Supply.**

1. INTRODUCTION

Prawns are an important commodity accounting for 19% of the international seafood trade. India is becoming a leading country in aquaculture production and trade. There is a rise in demand for dried prawns as there is a growth in demand for ready-to-eat foods. With the rapid urbanization, hectic work schedules, nuclear families, and increased number of working members of the family, there is evidence of healthy production of prawns and shrimp markets. The rising health concern is also one factor boosting the growth of the prawn market, health benefits of prawns include being rich in omega 3 Fatty acid, improved brain, and bone health. During the covid-19 period, there is a rise in the consumption of prawns and shrimps due to the fact that it will help to fight the diseases owing to the presence of antioxidants.

So, this shrimp or prawn mainly comes from the sea and also a river, pond, etc. When fishermen trap prawns from the sea, river, ponds they come with many unnecessary things like sand, stone, plastic, crabs, snakes, snails, leaves, other fish, etc. If you want, removing the shell from the prawn may be desirable according to the individual. But the vein must be removed before eating prawns. So, we are focusing on removing veins. As common sense, hand removal of veins and hand shelling is tedious and inefficient. More importantly, a serious bacterial infection is easy to be caused (Zhou, 2010), and it is most undesirable when large numbers of shrimps need to be processed instantly. Therefore, it is necessary to develop a machine that can be used to remove the dust, sand, and vein from the shrimp.

It is very important to clean prawns for good health. So, we are making a great machine for prawn cleaning. This machine's name is a prawn cleaning machine. We can easily clean prawns properly with the semi-automatic mechanism. This machine used some materials like stainless steel, Rubber, Iron, Plastic, etc. Prawn for Cleaning machine easily maintained and Cost very low and portable. It can be used everywhere like fisher ships, prawn farms (ponds, rivers, lakes), and Industries.

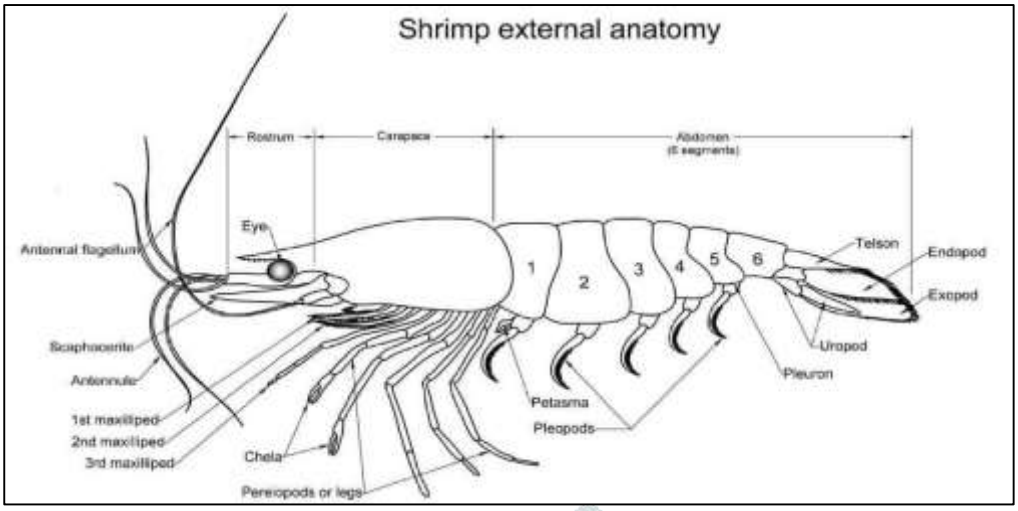

Fig-1.1: Prawn / Shrimp

2. SUMMARY OF THE MACHINE

This machine reviews monitoring and control systems for prawn fish cleaning. Dry prawn and prawn fish have an important role in business and constantly growing different types of manufacturing companies. We are introducing this machine to meet this need. We hope that the shrimp cleaning machine will be able to increase the production of shrimp marketers. This machine can complete its work in six steps which are expected to take no more than 5-7 minutes, the amount of output depends on the capacity of the machine. Since the machines are designed with the financial considerations of middle-class manufacturers in mind so that all types of manufacturers, big and small, can afford them and everyone can enjoy the functionality of this machine. The capacity of the machine will be based on the work process of the manufacturer so that the machine can be marketed to meet the needs of the manufacturer and based on the budget.

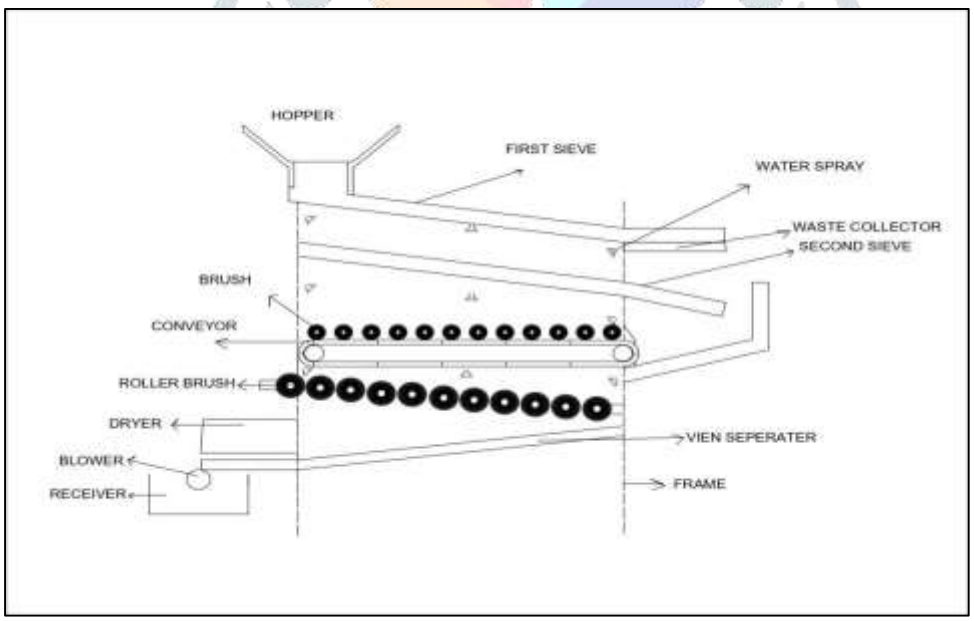

Fig- 3.1: Prawn cleaning machine

2.1. THE MAIN STRUCTURE OF THE MACHINE

The machine has three major parts; these three steps help us to clean our shrimp very quickly and completely. Names of the parts are,

- Sieve
- Conveyor and Brush
- Roller-Brush

The sieve will be able to separate the leaves, pebbles, sand, snail, crab, fish, and remove the unneeded things from the shrimp. After the next step, the conveyor and the brush will then begin the process. This process plays a very important role in cleaning the shrimp. The conveyor has small boxes that will give the shrimps a specific position and with the help of the brush, the body of the shrimp will be well-cleaned and removing veins. The roller-brush will remove the surviving veins and will clean again then take the shrimp's

back to the next step. In addition to these three parts, the shrimp cleaning machine has auxiliary parts at the beginning and at the end that help to complete these three important steps.

3. DETAIL VIEW OF MACHINE

3.1 HOPPER

A pyramidal hopper of stainless steel is set up at the top of the machine. It is the container used to hold raw material. Raw material means prawn coming from the sea after fishing along with unneeded material. The flow controller is fitted at the outlet of the hopper. The raw material is poured into a hopper, and it passes to the first sieve for the separation of prawn from other elements.

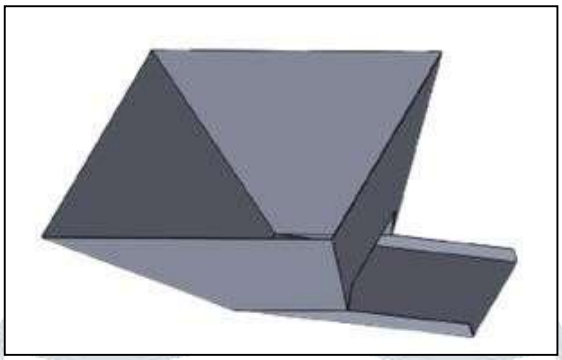

Fig -4.1.1: Hopper

3.2 FIRST SIEVE

Sieving is a simple technique for separating particles of different sizes. This sieve is made up of tin which contains a huge number of holes of diameter 25mm, it is inclined at the angle of 10 degrees from the datum. With the help of the controller raw materials are supplied to the sieve. Sieve vibrates with constant speed and also moves in linear motion. It separates unwanted things of size bigger than a hole from small particles. Unwanted things are passed through the outlet valve to the outside. Element size less than 20mm including prawn, snail, sand, etc. passes through the hole for further process in the second sieve.

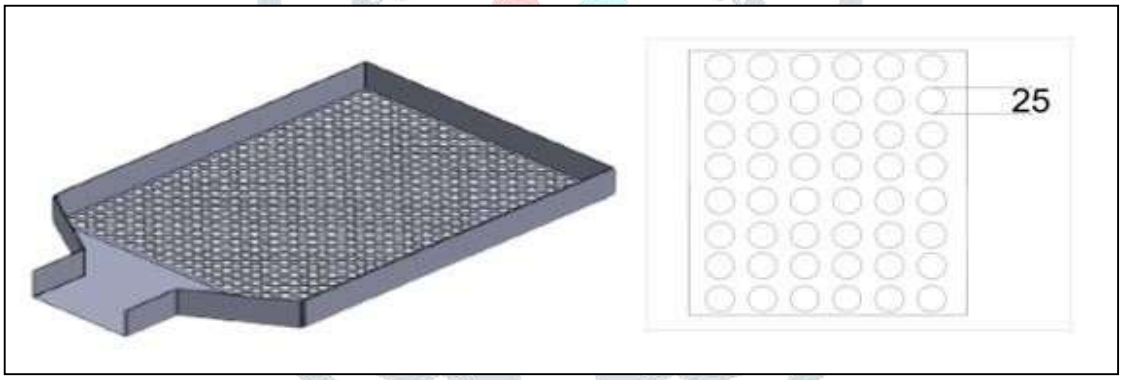

Fig -4.2.1: First Sieve

Fig -4.2.2: Sieve's holes

3.3 SECOND SIEVE

This Sieving is also made up of stainless steel, containing a huge number of holes of diameter 5mm, it is inclined at the angle of 10 degrees from datum separating particles of different sizes. Prawn coming from the hole of the first sieve is poured into this sieve which contains sand, small snail, and small stone. Water is a spray with high speed from the top of the sieve which helps to remove sand and dust from the prawn. Sieve is vibrating with constant speed along with linear motion, supplied by AC motor due to which smaller particles pass through the hole down and clean prawn remains in the sieve which passes to the receiver. Add a plate in the down of the sieve for collecting wastewater & small particles.

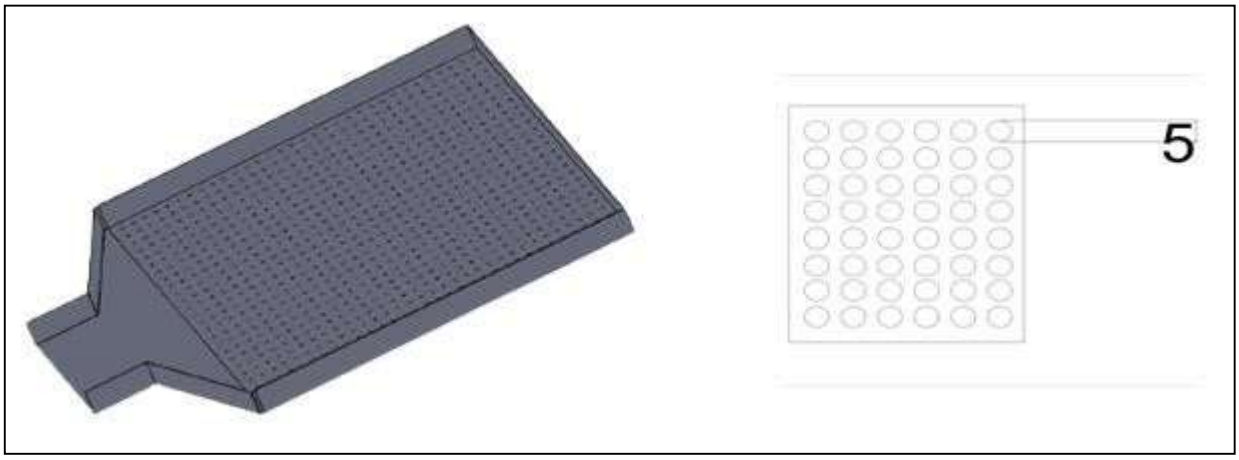

Fig- 4.3.1 Second Sieve Fig- 4.3.2 Sieve's Hole

3.4 CONVEYOR & BRUSH

A conveyor system is a common piece of mechanical handling equipment that moves materials from one location to another. Conveyors are especially useful in applications involving the transport of materials. This is a chain conveyor having a small rectangle. Prawn Collected in the small box of conveyor in a fixed amount from the receiver, move slowly on the upper surface and discharge to another side. The brush is fitted above the conveyor which continually rotted and touching on Conveyer's upper surface. When prawn passage through the conveyor, brush hit the prawn which removes and broke veins, antenna, bacteria, Sand, etc. In this process, 40% vein is removed and it's almost 90% free of all unneeded particles.

Fig- 4.4.1: Conveyor Fig - 4.4.2: Conveyor Box

3.5 ROLLER BRUSH

The roller brush is mounted below the conveyor, which stays in a fixed position by the support and rotates with the help of a motor. Continuously rotating brush removes remaining veins of prawn coming from a conveyor. Six brush is rotating in a clockwise direction and when prawn inter between two brush, first brush tries to push prawn in the downward direction, second brush try to pull upward that's why remaining veins sweep up. Due to gravity, the prawn comes down and collects in a sieve. That's a sieve having small holes less than the prawn size. Water is a spray with high speed from the top of the sieve which helps to out veins from the sieve. Clean prawn is sent for drying.

Fig-4.5.1: Brush Fig-4.5.2: Side view

3.6 DRYING AND BLOWING

The prawn comes from the last sieve, arrives in the drying box, then dries by hot air passing through it. So, the veins attached to the prawn will be removed by airflow. As a result, we get clean and healthy shrimp.

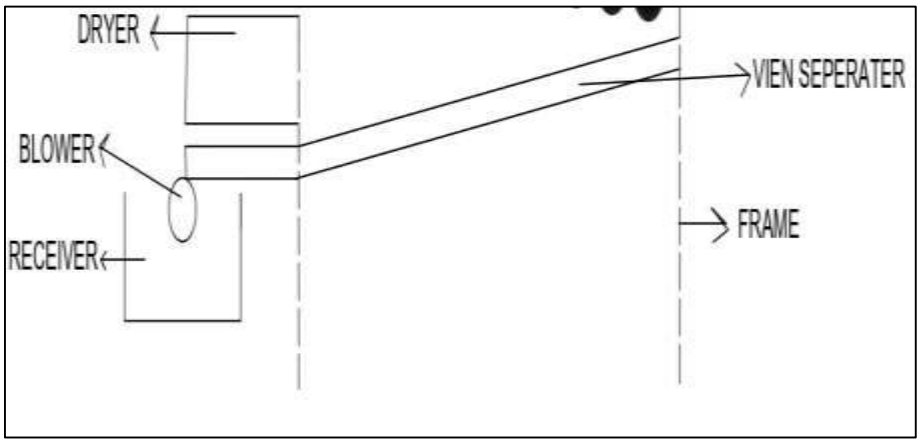

Fig-4.6.1: Dryer and Blower

4. CONCLUSION

All structural innovation and technological progress had been made in the past 60 years. As a summary, important advances are as follows:

1. The development of the machine significantly reduces the intensity, efforts, of labor.
2. With the reduction of labor efforts, the operation rate of cleaning gets faster.
3. Less labor intervention leads to less contamination and better quality. The meat breakage is lower because of the better brush and separation. All these causes better quality of the end product.
4. Reduce human infection and tedious cause due to hand removal of veins and garbage.
5. It will be able to increase the production of prawn marketers.

REFERENCES

1. Journal of Advanced Mechanical Design, Systems, and Manufacturing (Vol.9, No.2, 2015).
2. Concept, Design, and Development of Semi-Automated Potato Slicing Machine (IJSRD/Vol. 4/Issue 02/2016/129))
3. Jonsson, G., Method of cleaning shrimp, American patent disclosure US2784450 (1957). Jonsson, G., Shrimp cleaning machine, American patent disclosure US2850761 (1958).
4. Jonsson, G., Shrimp processing machine and method, American patent disclosure US3566437 (1971). 5. Jonsson, G., Shrimp processing machine and method, American patent disclosure US3751766 (1973)
6. Jonsson, G., Machine for cleaning shrimp, American patent disclosure US3122777 (1964a).
7. Jonsson, G., Machine for cleaning shrimp, American patent disclosure US3214789 (1965).
8. Jonsson, G., Method for cleaning shrimp, American patent disclosure US3238561 (1966a).
9. Jonsson, G., Machine for cleaning shrimp, American patent disclosure US3247542 (1966b).
10. Jonsson, G., Method of cleaning shrimp, American patent disclosure US3277517 (1966c).
11. Jonsson, G. Method for cleaning shrimp, American patent disclosure US3159871 (1964b)