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Design And Manufacturing Cow Dung Lifting and Cleaning Machine

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Abstract: Health is very important when concerned with work, so it's very important to keep the health in a good condition. While cleaning the animal waste many of people pick it up by hands and some of them by pads. People may undergo with diseases and some may feel allergic to do it. So the worker must be in good condition to make his/her work done. Animal waste cleaner suitable for scrapping animal waste in a passageway the waste which is in semisolid state and it will be collected in efficient way without harming the animals and maintain the hygienic conditions. This is a problem faced by many of the farmers who are undergoing the dairy practices they need to pick up with bear hands. Since there is no existing or affordable devices and because of this waste people get allergic and in order to avoid problems implementation of device is necessary - With the advancement of technology, automated floor cleaning machines are getting more attention of researchers to make life of man kind comfortable. The concept is developing in economic countries but the reasons for non-popularity is the design complexity, cost of machines, and operational charges in terms of power tariff. In this paper, a manual floor cleaning machine is proposed. In early day a floor is clean by using a broom which is operated by human hand, in this a continuous movement of human hand is required which create fatigue and time consuming . The aim of this work is to develop and modernized process for cleaning the floor with wet and dry. This machine is capable of performing cleaning of floor in dry as well as wet condition, and it also have storage box to store a dust. This floor cleaning machine is designed by keeping the basic considerations for machine and efforts reduction, environment friendly and easy handling. The machine will work on electricity and there is no need of training to operate it. This work can be very useful to improve the life style of man.

I. INTRODUCTION

There is a need for designing an affordable waste cleaner for large scale diary people. This project proposes to take on challenges associated with the accessibility and sanitation in developing countries by designing and building a cleaning system that will be reliable, durable, cost-effective and user-friendly. When the carriage is moved in forward direction the belt which rotates on the dc motor supply collect the waste with the help of rubber pads, later which is dumped in the tank and this procedure repeats. So it need not to apply much manual power to push it. However; there can be certain established organizations or diaries found within the community that can acquire this mechanism and use it for the greater good.

The fundamental reason as to why the concept has been chosen is the cost of the labor that is required to maintain the hygiene and the cleanliness of the cow shed. Places which are deep inside the rural belt also face the acute problem of labor shortage. The sheds located in the village belt may face problem of the electricity shortage but can be overcome with the help of a solar power backup. Animal welfare refers to both the physical and mental state of an animal, and how it is coping with its situation. An animal is considered in a good state of welfare if it is able to express its innate behavior, comfortable, healthy, safe, well nourished, and is not suffering from negative states such as distress, fear and pain. Good animal welfare requires disease prevention and veterinary treatment, appropriate shelter, management, nutrition, humane handling, transport and eventually, humane slaughter. Hence proper and a clean shed are a necessity to the cattle. Dairy products manufactured under unsanitary or unsuitable conditions have an increased chance of containing bacteria. Proper sanitation practices help to reduce the rate of bacterial contamination, and pasteurization greatly decreases the amount of contaminated milk that reaches the consumer.

II. LITERATURE SURVEY

Md.Manazir, 2-KedarnathB, 3-M.Chandan, 4 –Shahid Afridi Department of Mechanical Engineering, B V B College of Eng and Technology Hubli, Karnataka. India. Studied an This extensive research we found cost effective parts that met our goal of building a animal waste cleaner that can be used in any large scale dairies and facilitate the

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worker for the daily use of families in developing countries. Our initials goals were to construct a prototype that can collect the dung in an efficient way. Each component was thoroughly tested in order to provide results for the best product possible at the most reasonable price. There were obvious modifications applied to the final product in order to successfully aid to all the dairies in stress-free manner.

Gurucharan M Shinde, Hemanth Kumar Assistant Professor Department of Mechanical Engineering SJB Institute of Technology, Bengaluru, India. The paper work is about the project that we are proposing to automate the process of cleaning the dairy farm with the press of a button. The fundamental reason as to why the concept has been chosen is the cost of the labor that is required to maintain the hygiene and the cleanliness of the cow shed. The proposed model consists of a pair of guide ways which is a primary load carrying member. The rack and pinion mechanism helps in the movement of machine apparatuses.

Laxmi Parajuli , Samundra K.C. , Saroj Paudel , Subash Khatri, Department of Mechanical and Automobile Engineering, Tribhuvan University, Institute of Engineering, Pashchimanchal Campus Pokhara – 16, Lamachaur, Nepal. A standalone animal waste cleaning machine with an overall cost of 20,000 Nepalese rupees was designed and constructed to provide easy and effective floor cleaning. This machine can collect dung at a rate of nearly 4.5 kg per minute with a 98 percent efficiency. The machine iscompact in weight and has a modular construction. This makes the machine easier to operate. As the test findings showed, this is much more cost-effective than the manual dung management approach.

Dr. Shailesh Dhomne1 Rahul Gajbhiye, Ashutosh Singh, Pankaj Prajapati, Sachin Shende, Sumit Binzade, Assistant Professor, Dept. of Mechanical Engineering, D.B.A.C.E.R., Nagpur 2Student, Dept. of Mechanica Engineering, D.B.A.C.E.R., Nagpur. Reviewing various literatures on floor cleaning machines it is concluded that there are certain limitations in floor cleaning machines which can be worked upon. For example cleaning machines are made with an aim to clean only dry surface of the floor. This means that they are not use for wet surface of the floor. This is the major issue for cleaning the floor surface but in case of wet surface, floor cleaning machines contain moisture or little amount of water on the surface of floor. This machine can work in both dry and wet conditions. And at last this machine can dry the wet surface with the help of hot blower. Therefore this machine is also called as dry and wet floor cleaning machine. The ultimate need of this machine is satisfied and with the help of this machine can clean the floor easily. The application of this machine is high when compared to other existing floor cleaning machines. Overall the concept is very much helpful and there is scope of a lot of development in mechanical parts.

III. METHODOLOGY

3.1 Working Principal:

The primary goal of this equipment is to extract dung off the floor, collect it in a container, and securely dispose of it. A chain drive system transmits power to the picker. The picker takes dung and other garbage from the floor as it moves, then lifts itself and travels upward. The dung will be dropped into the container when the picker reaches the slider's uppermost point. As a result, dung will be collected from the ground. Four caster wheels make up the machine. When the container is filled, the dung is dumped into the appropriate location.

IV. DESIGN, DEVELOPMENT & DRAWING

4.1 Design of Frame:

After visiting Shri Lingayat Gaushala, it was observed about arrangement for Cows, The shed area for Cows is 55×45 square feet and linear Distance between the Cows while Standing and sitting is around 3 feet. Accordingly, it was decided to take the frame of 950 mm length, 680 mm width and 950 mm height for easy weight carrying, we have added same support in the base of the structure of the vehicle.

The frame of the machine is an integral part of the machine which defines the overall working aesthetics and nature of the machine it supports all over machine assembly all components of machine are mounted on the base frame metal used for fabricating frame is mild steel square pipes of 1 inch was cut to size and welded together to produce the skeletal frame.

Form trial and error method
Frame design for safety for 25.4*25.4*3 mm Square Hollow mild steel
channel b = 25.4 mm, d= 25.4 mm, t = 3 mm.
Consider the maximum load on the frame to be 30 kg.
Load of dunk to be 20 kg.

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Total load is 50 kg.
Force= W * g
= 50 kg * 9.81
= 490.5 N
Max. Bending moment = force*perpendicular distance of L Bar Length
= 50*9.81*360
M = 176580 N-mm

We know, M / I = σb / y Where,
M = Bending moment
I = Moment of Inertia about axis of bending
y = Distance of the layer at which the bending stress is consider,
I = bd3 /12
= 25.4 X 25.43 / 12 I = 34685.952 mm4
σb = My / I
= 176580*12.7 / 34685.952
σb = 64.65 N /mm2
The allowable shear stress for material is σallow = Syt / fos Where Syt = yield stress = 250 MPa = 250 N/mm2
And FOS is factor of safety = 1.5
So σallow= 250/1.5 = 136 MPa = 136 N/mm2 Comparing above we get, σb < σallow
i.e 64.65 < 136 N/mm2
So design is safe.

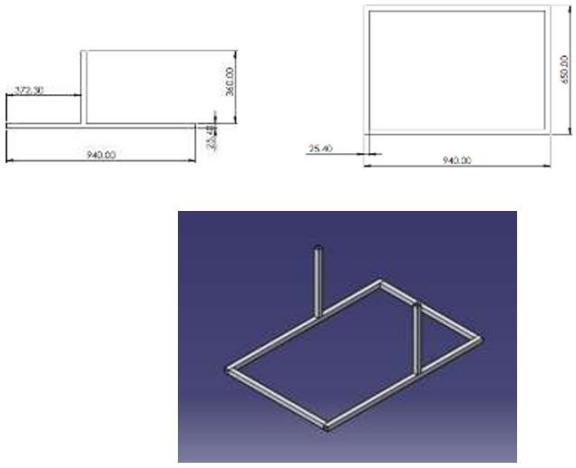

Fig. Design of Frame

4.2 Design of Conveyor Frame

On the basis of the bearing size we use the 1.5×1 inch And 1.5×1.5 inch MS Square pipe. Conveyor frame size is designed on the basis of machine frame design.

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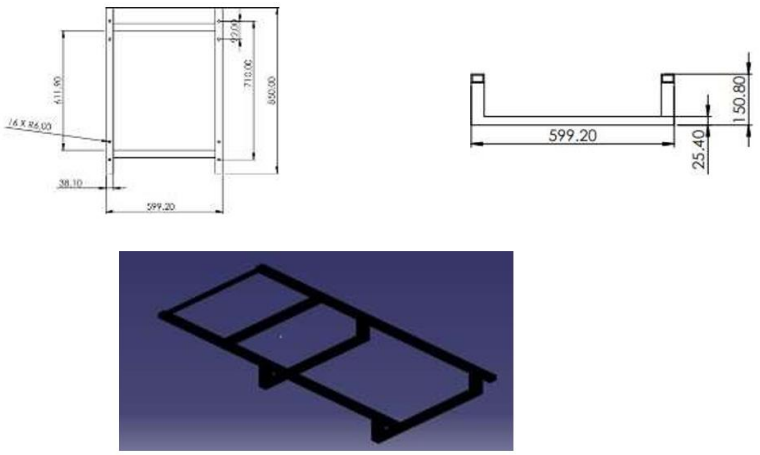

Fig. Conveyor Frame

4.3 Design of Sprocket:

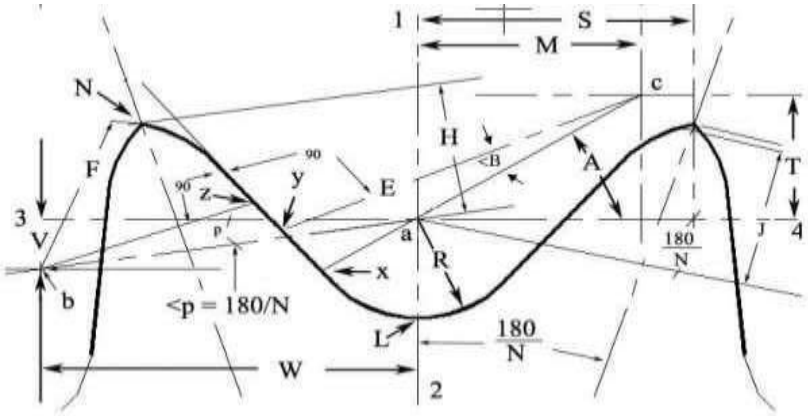

Fig. Sprocket Tooth Geometry

4.4 Chain Drive

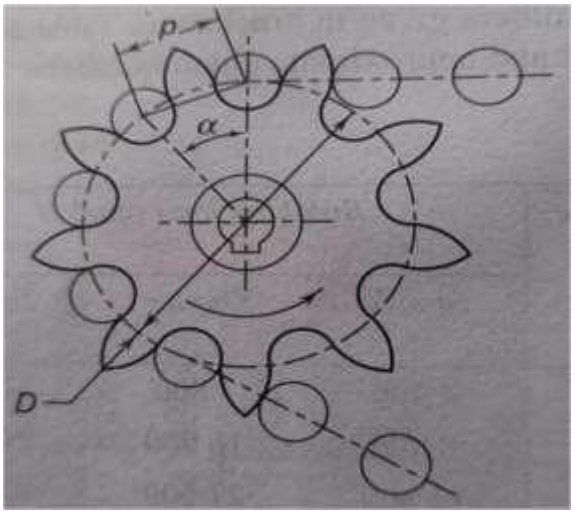

Fig. Chain drive

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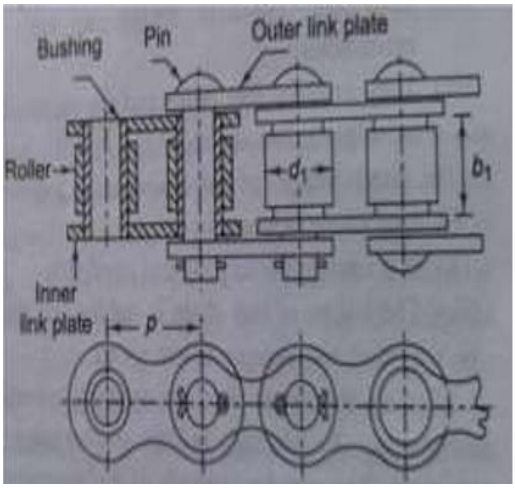

Fig Construction of Roller chain

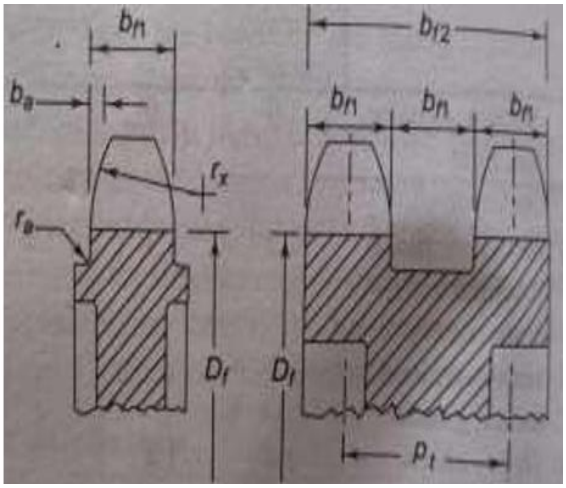

Fig. Rim profile of Sprocket

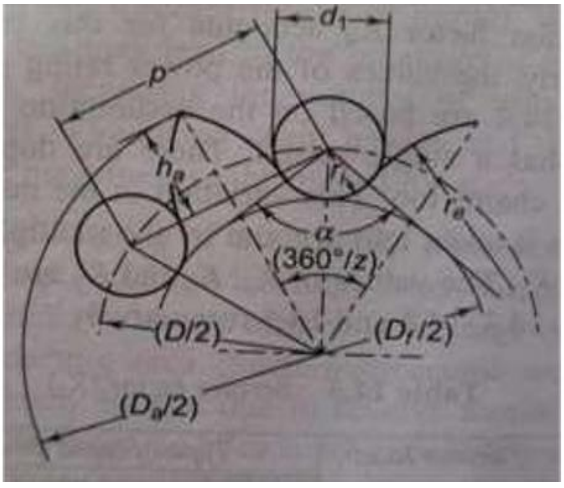

Fig. Tooth profile of sprocket

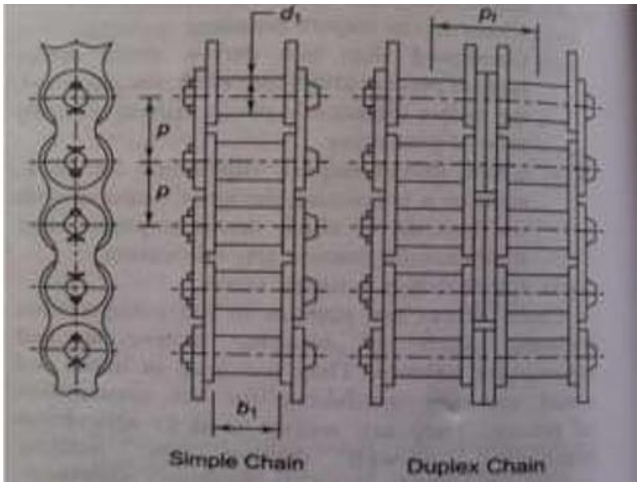

Fig. Simple and duplex chains

4.5 Calculation of Motor:-

We have to lift the 12 kg load (6 kg dung load And 4.5 kg scrapper plate load) at a inclined distance 700 mm at a time so we first calculate the power.

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Power Equation is P = F × V
P = 12 × 9.81 × 0.7 P = 82.404 Watt
So we get 90 Watt power motor.

So we get 12V DC 1500 RPM PMDC Motor. Its rated torque is 7.645 N.mm
For the machine running 50 RPM is required. So getting gear box attached to motor. Gear box ratio is 30:1
Output torque is 171.25 N. mm

4.6 Assembly of Machine Parts:-

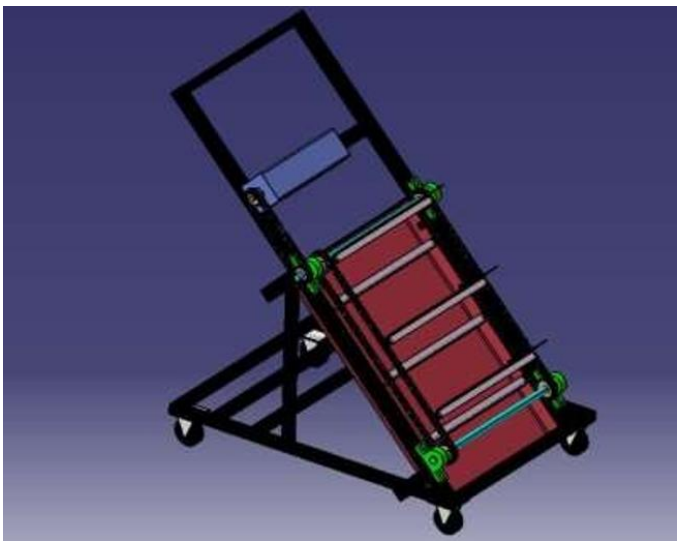

Fig. Cow Dung Lifting and Cleaning Machine

V. RESULTS

The Machine easily lift the dung. And Clean the floor effectively. It lifted 98% dung from the floor. With Using this machine all cow shed cleaned within 15 to 20 minutes easily.

Fig. Final Results

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VI. CONCLUSION

The Cow Dung Lifting and Cleaning Machine project has successfully achieved its objectives, providing a practical, efficient, and user-friendly solution for dairy farms. It addresses critical issues related to labor, hygiene, and environmental management, proving to be a valuable asset to the agricultural sector. Continued innovation and improvement will further enhance its benefits, contributing to more sustainable and productive farming practices.

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