

Designing of Egg as well as Feed Handling Trolley for Poultry Farm

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Abstract - The product is mainly designed for providing the feed at a constant rate by using hopper mechanism and also handle eggs from the poultry cage to the storage area. The necessity of this product is aroused as it drastically reduces the time to collect the eggs with less efforts compared to carrying them manually by hand. Secondly, proper dumping of feed at a constant and calibrated rate is possible through this product. The height of the egg rack as well as feeder rack is high. In order to reach that height, scissor mechanism was designed by using simple hydraulic jack. Each tray is designed to carry upto 90 kg of weight. This trolley is mainly designed to reduce the strain on the user and reducing the operation time. Currently there is no such trolley designed for serving both purposes. The trolley has a couple of pedals to adjust height accordingly, one to uplift the tray and another pedal to decrease the height of the tray.

Key Words: feed, handle eggs, hopper mechanism, scissor mechanism, hydraulic jack, adjust height.

1. INTRODUCTION

There are many types of trolleys which are made for different purposes. There are trolleys that are used to rack the eggs and there are some other trolleys to distribute the feed. The product is designed so that it can serve both purposes, racking eggs as well as feed distribution in calibrated amount. This trolley is capable to feed two tier poultry farm at once. This product can hugely reduce human efforts.

1.1 Problem Statement

To make a product (Trolley) which can serve both purposes – Egg collection as well as Feed distribution in a calibrated amount. The amount of grains delivered plays an important role here. The height where the feed going to be put in first place is very high, so some arrangement needs to be done on that. The volume capacity of the each hopper must be around 75 kg and there should be also a provision to carry atleast 650 eggs at a time.

2. DESIGN OF THE TROLLEY

This topic deals with the designing of the trolley and is divided in various sub-parts. The overall system is designed to collect eggs and feed the hens. Refer Fig. (1) & Fig. (2).

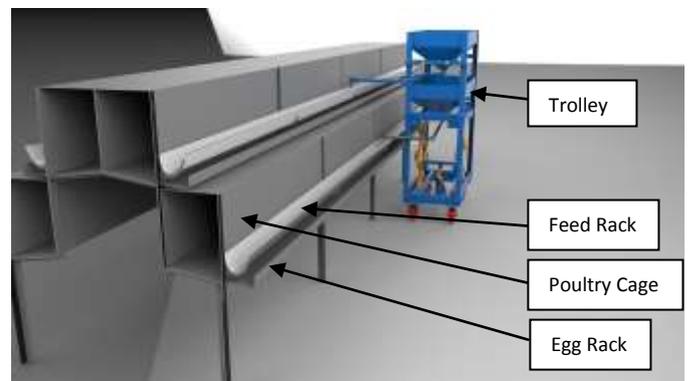


Fig. (1): Overall Trolley design

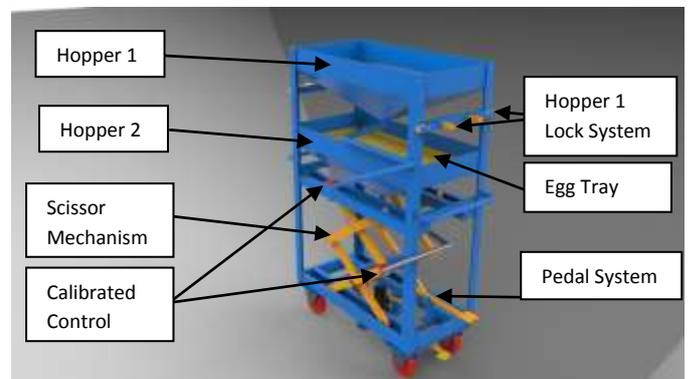


Fig. (2): Sub-Parts of trolley

2.1. Scissor Mechanism

This mechanism involves eight linkages arranged in order to act as double scissors, Fig. (3). When the Hydraulic jack is pumped, the Jack lifts the bar which connects both scissor arms, Fig. (4).



Fig. (3): Scissor Linkages

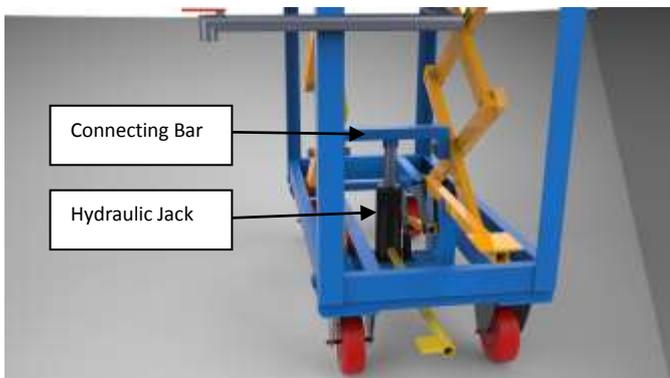


Fig. (4): Connecting Bar & Hydraulic Jack Position

2.2. Pedal System

The system involves two kind of pedals, one for lifting the Jack and another is to lower the Jack. Lifting is done by using certain linkage structure so that when we give for on the pedal downside, it will lift the jack's lever up and when released, will return back to original position by the use of Return spring as shown in Fig. (5). The second pedal is used for lowering as when the jack's screw when turned anticlockwise, it lowers the jack. The pedal when released after lowering the Jack, returns to the original position with the help of torsion spring, fig. (5).

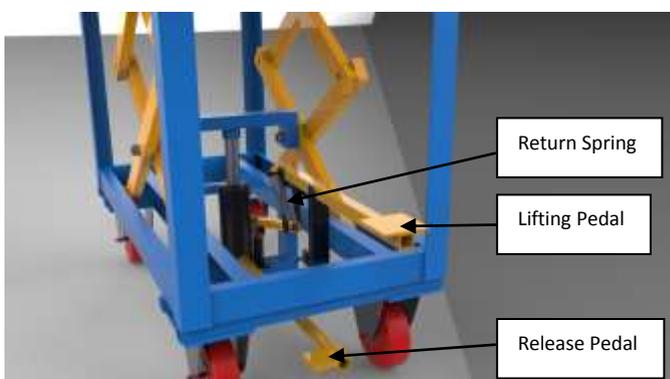


fig. (5): Pedal Mechanism

2.3. Feed Hopper & its Calibrated Release

This system has a hopper made to hold 75 kg of feed for hens, refer Fig. (1). This is made possible by calculating the inner volume of the hopper which is around 0.126m^3 . The density of the feed considered here is 600 kg/m^3 . Both the hoppers have pyramidal structure as it is easy to manufacture and most convenient design. At the bottom center of the hopper, pipe is connected to convey the feed from the hopper to feed tray. The feed rate is controlled by the valve. Each hen requires 120 grams of feed per day.

Cage dimensions of the poultry of three hens in a cage: Length = 0.380m, Breadth = 0.300m & height is 0.4m.

Considering that each hen has about 0.126m feed space.

So, there should be 1 gram/mm throughout the feed tray. The feeder pipe is adjusted accordingly by using the valve and maintaining the trolley speed.

The hopper 1 is lowered when the locking mechanism is disengaged. Latch is used to keep the hopper 1 in the top even in the case when the lower hopper is lowered in case when we have to collect eggs, Fig. (6).

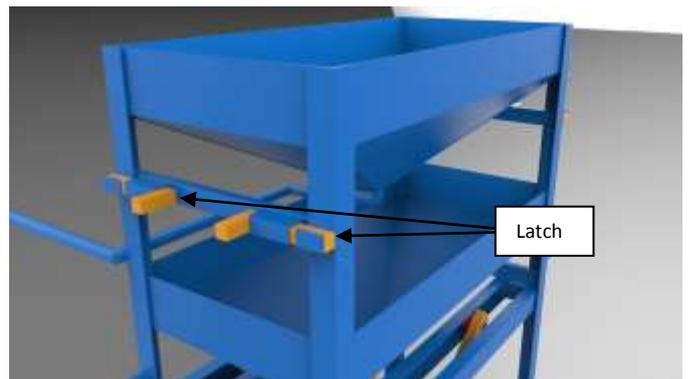


Fig. (6): Locking mechanism with Latch.

2.4. Egg Tray

The tray is made as such that it can be removed when not in use and has hinges in the middle of the tray so that it can be easily folded, Fig. (7) & Fig. (8). Each tray is designed to carry the weight of 900 eggs at a single time and also has enough space to keep 3 different rows of the crates. Fig. (9) shows the arrangement of the egg crates along with some eggs.

The Hopper 2 has four side pillars on which the hopper 1 rests when the latch is released, Fig. (10).

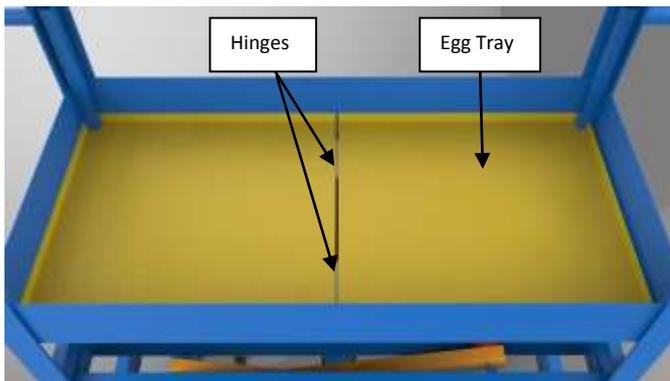


Fig. (7): Egg Tray - Position



Fig. (8): Egg Tray - Foldability

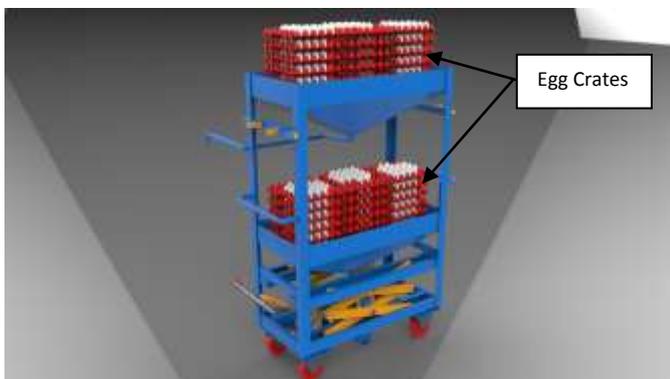


Fig. (9): Egg loaded Trolley



Fig. (10): Pillars for supporting Hopper 1

3. WORKING PROCEDURE

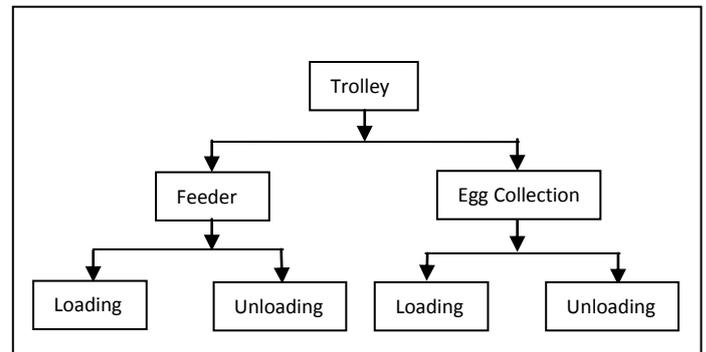


Fig. (11): Block Diagram

The trolley has two uses, one feed distribution and another egg collection. Refer Fig. (11).

Feed Loading:

- Releasing the latch when jack is on its higher position, then slowly lowering the hopper 1 as well as hopper 2 by using release pedal.
- Lower the hopper 1 to the position from which feed can be transferred in to the hopper.
- Pump the pedal after loading the hoppers.
- Latch the hopper 1 again.

Feed Unloading:

- This is done by simply turning on the valve which is installed in the release pipe.

Egg Loading:

- Firstly, unlatch the hopper 1 and lower it using release pedal.
- Then lay down the egg tray as shown in the Fig. (7) & Fig. (8).
- Start arranging the crates while collecting the eggs.
- After the capacity of hopper 1 is topped, start pumping so that the hopper reaches the maximum height.
- Then latch it back and start arranging the crate in hopper 2 while collecting the eggs after laying down the egg tray.

Egg unloading:

- Taking out the crates at the storage unit after collecting all the eggs in the similar way as the were loaded in.

4. CONCLUSION

This project serves many purposes and also helps to reduce the human efforts required to carry out each task. The design of the product was made by discussing with the workers who work in the poultry farm and keeping in mind the difficulties that they face in doing their work. The design was step by step made according to the necessity of the functions. This product can be used for two tier poultry farms only as height of the product is the main concern. It is much cost effective than doing automation and saves a lot of time and efforts if the work is done manually by hands.

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