

Design and Fabrication of Drainage Cleaning System

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Abstract: Nowadays even though automation plays a very important role in all industrial applications, the proper disposal of sewages from industries and commercials are still a challenging task. Drainage cleaning system is proposed to overcome the real time problems. With the continuous expansion of industries, the problems of sewage water must be urgently solved to minimize the increasing sewage problems from industries that effects the surrounding environment. The solid waste produced from the industries are very harmful to humans and to the environment.

Keywords: Drain cleaner, fabrication and working of automatic drain cleaner, waste water.

1. Introduction

Water is a basic necessity of humans and all living beings. There is a plenty of water on earth but that is not suitable for human use. Clean water is more important and is used for some purpose. The impurities present in water can cause hazardous diseases. Impurities in drainage water can be like empty bottles, polythene bags, papers etc. Today when the scheme like “Swatch Bharat Mission” is at peak of their age and everyone working towards making their surrounding and country clean, our group has sort to work out on a mechanism to make drains of our country free from solid waste and hence playing a major role in cleaning our society. The most striking feature of Harappa civilization (Indus Valley Civilization) is that the Indus Valley people had constructed their drainage system on very scientific lines. The drainage system of Mohenjo-Daro is so elaborate that “the like of which has not yet been found anywhere in the world in any other city of the same antiquity. House drains emptied themselves into the main drains which ran under the main streets and below many lanes. Solid matters that are created by human or animal activities, and which are disposed because they are hazardous or useless are known as solid waste. Most of the solid wastes, like paper, plastic containers, bottles, cans, and even used cars and electronic goods are not biodegradable, which means they do not get broken down through inorganic or organic processes. Thus, when they accumulate they cause a health threat to people. Decaying wastes also attract household pests and result in urban areas becoming unhealthy, dirty and unsightly places to reside in. Moreover, it also causes damage to terrestrial organisms while also reducing the uses of the land for other more useful purposes. Therefore, this problem needs immediate remedial measures. These impurities present in drainage water can cause blockage or the drainage system. The drainage system can be cleaned time to time manually or such a system can be designed that will automatically throw out wastages and will keep the water clean. This project is designed to keep clean the drainage system and helps the smooth working of the system. This project helps to clean water in the drainage system each time any wastage appears and this form an efficient and easy way of cleaning the drainage system and preventing the blockage. It also reduces human power and improves the quality of water that is cleaned. The drainage systems are cleaned when there is no water in them i.e. when it is not raining, but when it is raining the drainage systems cannot be cleaned because of the harsh conditions of the rain which no one would volunteer to ensure that garbage does not enter into the drainage systems.

2. Literature Survey

Prabhushankar N et al. [1] designed a machine which used reciprocating pump as the main component instead of centrifugal pump for dewatering of drainages. As centrifugal pump was costlier and less effective in complete removal of suspended and heavy solids. They used pneumatic and spring system with reciprocating cylinder. There was use of pneumatic cylinder which used power of compressed air to produce linear motion with reciprocation. One component of pneumatic drainage system was spring return pneumatic cylinder. One drawback with it was less efficiency, as part of force produced by cylinder was lost as it tried to push against the spring.

T Duricic et al. [2] investigated on removal of phosphate from synthetic wastewater by using electro coagulation method. Although phosphate was a precious nutrient but its high quantity causes eutrophication. Result showed decrement in phosphate removal rate with increase in its initial concentration and also by increasing electrolysis duration removal of phosphate increased. Experiments showed that aluminium electrode

had higher removal efficiency (98.9%) compare to iron electrode (93.5%) for 40 minutes of treatment.

Nithyavathy N et al. [3] modified the “Drainage Cleaning Machine” with the help of his group members. They kept their attention towards the health of municipal corporation workers. They proposed, “Remote Control Sewage Cleaning Machine”. They used RF transmitters and receivers, 9-volt battery and four channel relay board. In the previous system when the municipal corporation member had to clean the sewage they had to land into drainage, but in that modified version, they can control the machine speed and direction with the help of remote. Less skilled worker could easily handle that machine.

Vetrivel S et al. [4] proposed a system to build a sewer robot which was capable of cleaning the blocks in sewer pipe of diameter from 80-100mm without employing humans. In that caterpillar type wheel system were engaged to increase the cleaning while vertical movement. That whole system was developed in low cost & inspection of pipe could be easily done with the help of “Sewer Robot using concept of Sensor Locomotives”. That whole system worked on instruction. Four bar chain mechanism were used so that it could expand and shrunk their wheel suspensions, together its own movement. By using some sensors and processors together along with locomotive, they could easily do inspection & cleaning action where the human hand could not reach easily.

3. Proposed Model

3.1 Fabrication

Normally during fabrication of the model the basement part is prepared by welding the metal bar by arc welding. Then the supporting metal rod are welded at an angle of 90 degrees from the basement, the bearing is welded to the supporting rod and the front part of the basement. Cylindrical shafts are fixed to the bearings and also conveyor belt fixed to the shafts. The tools lifters are fixed to the conveyor belt at an equal distance from each. Then the collecting box is fixed at backside by welding.

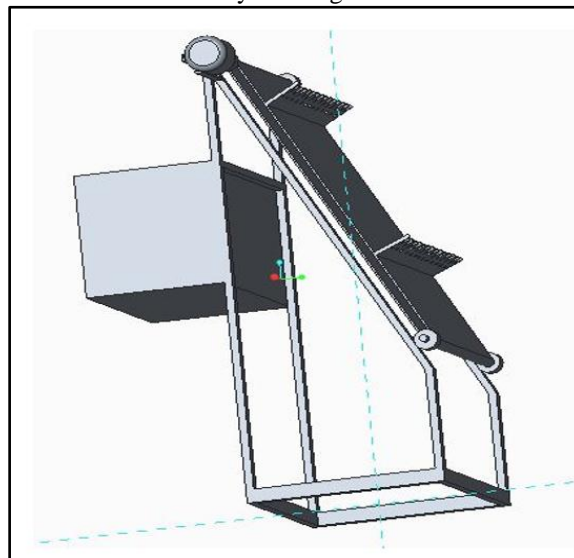


Fig. 1 drainage cleaner

3.2 Working

The drainage cleaning machine helps us to clean small or big sewage through its mechanical design and working. This machine consists of parts such as motor, battery, shaft, lifter, collecting box etc. When we give power to this machine then motor starts working which rotates the shaft.

Due to the rotation of shafts, the conveyor belt connected to the shafts rotates. As the conveyor belt rotates the two lifters which are connected to the conveyor at half length of the conveyor starts rotating as well. When one lifter completes one round from down to upward direction, it takes all the garbage material like waste bottles, plastics, tins, etc. and the grid drops it on the collecting box attached at the back. The collection rate of garbage will be continuing.

This device is placed across drainage so that only water flow through lower grid, waste like bottles, plastics which are floating in drain are lifted by teeth of lifter which is connected to conveyor. This conveyor is attached to shafts driven by motor. When motor runs the conveyor starts to circulate making teeth to lift up. The waste materials are lifted by teeth and are stored in waste.

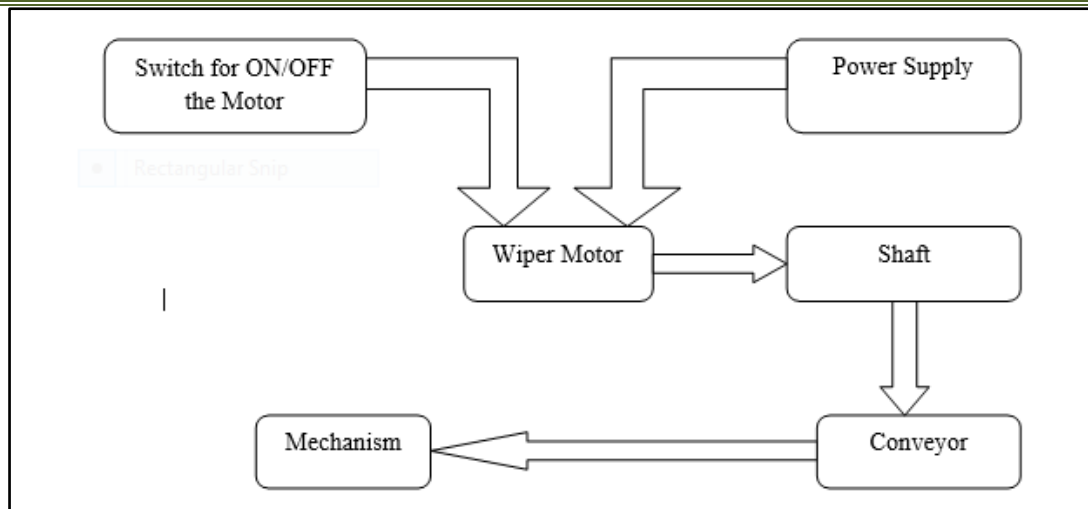


Fig. 2 working flow

4. Materials Required

TABLE 1 Materials Required

Sl..No	Description	Size/Qty
1	Mile steel	24 feet
2	Conveyor Belt	1 belt
3	12v DC Motor	One
4	Wheels	Four
5	12v 7.2Ah Battery	One

5. Advantages and Disadvantages

5.1 Advantages

- It is reliable and portable.
- It cleans continuously.
- It is time saving.
- Development materials are regularly locally applicable.

5.2 Disadvantages

- Rust.
- Small vibration occurred due to wire brush wheel attachment.
- It is able to clean solid waste only.
- Cannot withstand higher loads.

5.3 Applications

- It can be used as part of plastic business.
- It can be used as part of Municipality Corporation.

6. CONCLUSION

After all the testing project was successful in representing the idea in practical way. The project works with ease and in an efficient way. The waste material was able to be fetched from the water and collect it in the garbage collector container. Hence this project can be applied in remote and slum areas with effectiveness. Since drains are linked with hygiene and in slum areas this is major problem and this project can be implemented in those areas and can safeguard health of the people. The concept of this project is very useful in monsoon because in rainy season our drains are usually over flowing and it can be blocked by solid wastes. This project can be incorporated with “SWACCH BHARAT ABHIYAAN” which is a revolution in present times. In India as drains and sewage paths are open, so this project or mechanism can become very handy and use to clean them.

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