

OVERHEAD WATER TANK CLEANER

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Abstract

Aim of this project is to develop a mechanical system for cleaning domestic cylindrical water tank. This mechanical system includes two main mechanisms which are bearing and shaft (drive shaft mechanism) mechanism and a linkage mechanism. The bearing and shaft mechanism is used to rotate whole mechanical system 360 degrees for cleaning the cylindrical tank. The bearing is fixed to the motor with a shaft and the linkage mechanism is attached to the motor shaft which is connected with bearing. PVC brushes are attached to the ends of the linkage. Linkage, is made in such a way that it can be adjusted according to inside diameter of the tank. When the motor is started the brushes starts rotating with the help of linkage, cleaning of wall and base of tank takes place. The purpose of this project is to reduce the human efforts and to avoid the chemical influence on health of person entering the tank for cleaning. In this modern world, cleaning of overhead tanks manually is a tedious job. To overcome, this we have aimed to make a mechanical system tackling all the disadvantages of cleaning overhead tanks. This system, overhead tank cleaning is designed to provide high safety, high efficiency, less time for cleaning and to avoid environmental pollution problems. Purpose of this project is to clean domestic cylindrical water tank with the help of mechatronics system. The mechatronics system consists of a bearing and a pipe which works like a shaft, attached to two arms with brushes with the help of linkage at ends. By rotating the pipe with the help of motor, the 360 degrees motion of the brushes is achieved. The main shaft (PVC pipe) is powered by an A.C motor. The main pipe which passed through bearing can be rotated using motor which works on AC current. And the side brushes are connected with the help of a, iron coupling with the main pipe. The clockwise rotation of the main shaft will make the arms move and vice versa. The whole operation is controlled by a circuit consisting of relay switches, motor and a accelerometer. The amount of speed of motor can be controlled by accelerometer.

1. INTRODUCTION

In recent studies it has been found that no mechanical system, is based on machine used in cleaning of overhead tank. This is because of the irregular shape and various heights of the tank locations. With previous survey made an attempt to make a machine by automation process for cleaning tank. An alternate solution has made a plan to solve this problem. In India, the usage of syntax tanks by the people is approximately 71% After studies made the information that have faced a lot of difficulties like continuous work in the dirty places, irregular payment and other various reasons. Continuous work and irregular payment may also be the major reason for this attempt. So came to a conclusion that cleaning the overhead tank using any mechanical system process can be useful to solve all these problems. In this case, machine has the capability to clean the tank easily and quickly. Designing of our machine is based on the survey report conducted. Every day we use the tank water for brushing and bathing, for cleaning and moping, for washing clothes and in other household chores. With the passage of time, sediments scale and algae get deposited on the walls, ceiling and floor of the water tank. This deposition contaminates the water and makes is unfit for use. With time algae and bacteria grow and breed in this water

infect it and could make us fall sick eventually. Hence water tank cleaning is very important. Manual scrubbing in which wall and floor of tank are scrubbed to remove dirt, sediments, fungus and stains, but this method is more tedious and time consuming. The water tank can also be cleaned by using chemicals to remove the dirt and sediments. The chemicals used may affect the human health. Pressurized water can be sprayed on the walls of the tank which will remove the dirt from the tank surface. These methods are time consuming and require more efforts for cleaning.

2. RELATED WORK

- 1) A mechanical system which clean the tank mechanically using brush, rack and pinion, bar linkage and motor, but this method is not much effective.
- 2) Sedimclean water tank cleaning machine by prayosha in 2017, which clean sediments in the tank. It is a vacuum cleaner type system which clean the tank without removing the water from the tank. But this only clean the sediments in the tank not the scale and algae inside the tank.
- 3) Vacuum tanker for cleaning storage tanks which is an, vacuum cleaning system by Brown J.A in 1989, for cleaning the water tank and also acts as a water pump to force water, but this is very expensive.

4) An efficient swimming vehicle is a mechanical system by M.S.Triantafillou in 2003, to clean the swimming pool using motor, mechanical arrangements, brush and floss, this system works well, but works only for swimming pools.

5) Cylindrical water tank cleaner by ShubhamSrivastav in 2016, which heavy in weight and large in size.

This section presents the critical analysis of existing literature which is relevant to overhead water tank cleaning system and its mechanisms. Though, the literature consists of a lot many research contributions, but, here, we have analyzed around five research and review papers. The existing approaches are categorized based on the basic concepts involved in the mechanisms. The emphasis is on the concepts used by the concerned authors, the database used for experimentations and the performance evaluation parameters. Their claims are also highlighted. Finally, the findings are summarized related to the studied and analyzed research papers. Section concludes with the motivation behind identified problem.

As, we know the cleaning of overhead tanks manually is a tedious job and it is time consuming work. Some, people use chemicals to clean the water tanks which removes the dirt but harmful for human. Manually, it requires a lot of human efforts. But if we don't wash our water

tanks with the passage of time sediments and algae get deposited on the wall, this causes severe health problems when we use such water. To overcome all these problems and keeping in mind all these drawbacks,

We came up with this idea water tank cleaning equipment which requires less time and less human efforts for cleaning.

3. IMPLEMENTATION

To design a mechanical system, which helps in cleaning the overhead cylindrical water tanks.

➤ The mechanical system must be a user friendly machine.

➤ A mechanical system to reduce human efforts and decreases time usage while cleaning the water tanks.

Components Required

- Ac Motor
- Connecting Wires
- Accelerometer
- Bearing
- Pvc Pipes
- Iron Coupling
- Brushes
- Screws And Bolts

Methodology

Overhead water tank cleaner, the mechanical system for cleaning domestic cylindrical water tank. This mechanical system includes two main mechanisms

which are bearing and shaft (drive shaft mechanism) mechanism and a linkage mechanism. The bearing and shaft mechanism is used to rotate whole mechanical system 360 degrees for cleaning the cylindrical tank. The bearing is fixed to the motor with a shaft and the linkage mechanism is attached to the motor shaft which is connected to coupling. PVC brushes are attached to the ends of the linkage. Linkage, is made in such a way that it can be adjusted according to inside diameter of the tank. When the motor is started the brushes starts rotating with the help of linkage, cleaning of wall and base of tank takes place. This system consists of a bearing and a pipe which works like a shaft, attached to two arms with brushes with the help of linkage at ends. By rotating the pipe with the help of motor, the 360 degrees motion of the brushes is achieved. The main shaft (PVC pipe) is powered by an A.C motor. The main pipe which passed through bearing can be rotated using motor which works on AC current. And the side brushes are connected with the help of a, iron coupling with the main pipe. The clockwise rotation of the main shaft will make the arms move and vice versa. The whole operation is controlled by a circuit consisting of relay switches, motor and a accelerometer. The amount of speed of motor can be controlled by

accelerometer. This is how we can control this tank cleaner.

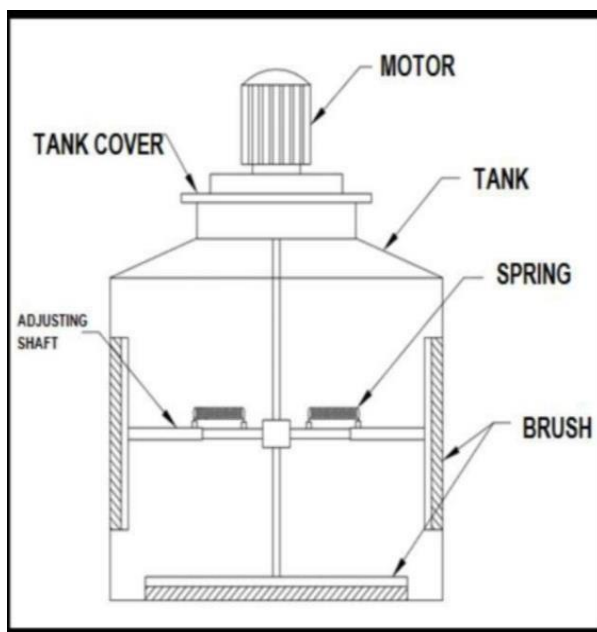
Project Justification

Usually, we see in our daily life it is very difficult to clean the water tanks, and it takes a lot of time to clean the tanks, but if we avoid cleaning the tanks it leads to formation of algae in the tanks and a lot mud struck at the bottom of the tank, and this raises severe health issues to the people who use that particular water. Every mechanical system is suitable for only particular type of tank, because of various diameters of tanks there is no system which can be suitable for all types. If anyone wants to clean the water tank they used to go into the tanks and it becomes much difficult to clean the tanks, And there are some water tank cleaning services in some urban services who demands high price and they are not up to the mark in their job. And there are some machines which are high expensive so common people can't afford the amount. Manual scrubbing the dirt and walls of the tanks is more tedious job and time consuming, if we use chemicals to clean the tanks those chemicals leads to many harmful affects for humans. Spraying the pressurized water on tank walls which will remove dirt on tank walls, all these methods are very time consuming and require more efforts from human, some mechanical systems are hard to install and

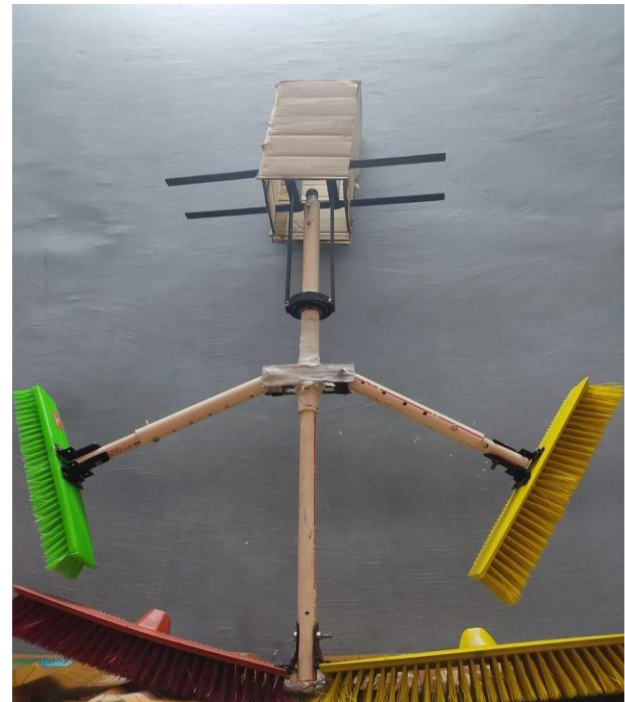
they are in over in weight, so keeping all these and to avoid these type of drawbacks, we came up with an idea to make a mechanical model which cleans the water tanks without any these type of difficulties. This is a mechatronics system which works both on electronics and mechanics. This model is completely differ from the existed ones which helps in cleaning the overhead water tanks. So this model helps in cleaning the water tanks which also less expensive We can adjust the brushes for any type of diameter of the tank and this is much reliable and can be easily operated and we can carry easily than any other existed systems.

4. EXPERIMENT RESULT

Block Diagram



Prototype



5. CONCLUSION

The water tank cleaner was used to clean the water tanks by using rotating brushes. This method was more effective and safe than the conventional methods. This method is capable to clean water tanks within less time and human efforts. Advanced model for tank cleaning system is cleaning the tanks thus making the operation user friendly. The working prototype is promising both in terms of imparting cleanliness and avoiding excess manpower. The future scope of the project is to extend it with auto feeding mechanism by which the manpower involved in feeding gets removed. Through the help of the auto feed mechanism it is easy to clean the tanks without excess man power. The project can be even extended to increase the cleanliness of the tank by

insulating the frame and other components using stainless steel.

This system is not much heavy weight and not large compared to existing solutions. It is also very low in cost compared to existed ones, consumes less power. We can increase the speed and reduce the speed of the motor as per our required because our system consists of an accelerometer.

6. REFERENCES

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