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Water Surface Garbage Cleaning Mechanism

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Abstract:- The proposed " Water Surface Garbage Cleaning Mechanism " aims to replace manual gutter cleaning with an automated solution to prevent blockages and enhance waste disposal efficiency. Mechanical evacuation plays a vital role in domestic and industrial applications, but clearing sewage blockages often poses risks, including loss of human life. This system promotes environmental protection by managing waste and preventing hazards like water pollution, flooding, and even climate change. By removing garbage from drainage systems, it prevents blockages and avoids the accumulation of waste in residential areas. The automated system is designed to filter out wastes like plastics and bottles from water flow, ensuring efficient disposal and minimizing human intervention, thereby enhancing safety and sustainability.

Keywords:- *Automated Drainage Cleaning System, Gutter Cleaning, Mechanical Evacuation, Sewage Blockages, Waste Management, Environmental Protection, Water Pollution.*

I. INTRODUCTION

The "Water Surface Garbage Cleaning Mechanism" project addresses the long-standing challenge of maintaining clean drainage systems by offering an innovative, automated solution. The main objective is to design and develop a device capable of cleaning drainage systems without human intervention. This machine will detect blockages, remove debris, and flush pipes with water, automating the entire process of maintaining drainage systems in residential and commercial areas.

The system aims to reduce the workload for maintenance personnel and enhance the efficiency of waste management in drains. In countries like India, waste like plastic bottles, covers, and sanitary pads frequently accumulate in open drains, especially during the monsoon season. This leads to blockages, flooding, and contamination when the drainage system overflows or opens near rivers, contributing to water pollution.

Blocked drains not only disrupt everyday life but also pose significant health risks. The accumulation of stagnant water can lead to outbreaks of waterborne diseases such as cholera, typhoid, malaria, and worm infections. These health hazards, combined with the inconvenience of flooded streets and polluted rivers, create serious problems for the local population.

Currently, no automated system exists to clear these blockages in India, and the task is performed manually by workers. Manual cleaning is hazardous, requiring significant physical labour in unhygienic conditions. This project aims to eliminate these risks by replacing the manual process with an efficient, automated drainage cleaning solution, offering a more sanitary and sustainable approach to waste disposal.

II. LITERATURE REVIEW

Ganesh U L, showed the usage of mechanical drainage cleaner to replace the manual work required for drainage cleaning system. Drainage pipes are very dirty. Sometimes it is harmful for human life while it is need for cleaning drainage system. To overcome this problem, they implemented mechanical semi-automatic drainage water cleaner and so the water flow is efficient because of regular filtration of wastages with the help of that project. Different kinds of environment hazards reduced with the help of Drainage system machine.

James C. Conwell, G. E. Johnson proposed the design and construction of a new test machine configuration that offers same advantages over the traditional one. The new machine and attendant instrumentation provides more realistic chain loading and allow link tension and roller sprocket impact monitoring during normal operation. The incorporation of idle sprocket allows independent adjustment of test on length and preload.

S D Rahul Bharadwaj, proposed with the automatic cleaning of waste water in order to prevent global warming and melting of glaciers. The results emphasize the need of waste water treatment plants, through which the water is treated before suspending in rivers. Firstly power is generated and that power is used for waste water cleaning process.

- *Current Drainage Cleaning Mechanism*

- *Figures and Design*

Fig 1 Working Principle

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Fig 2 Working Model of Drainage Cleaning Mechanism

- *Working Principle*

The Water Drainage Cleaning Mechanism automates the process of removing waste from drainage systems using a mechanical design. Key components include a motor, shaft, chain, sprockets, lifters, and a collecting bin. When the motor is powered, it rotates the shaft, which turns the sprockets, causing the connected chain to rotate. Lifters attached to the chain move in a loop, scooping up debris like plastic bottles and waste from the water. As the lifters complete their cycle, they deposit the collected garbage into a bin. The system is positioned across drains to allow water to flow through while waste is lifted by the lifters' teeth. The chain and sprocket system, driven by the motor, ensures smooth operation, with durable materials like steel used for the chain to withstand cleaning stress. Waste is gathered in a container for easy removal, providing an efficient solution for cleaning sewage and managing trash without human intervention.

- *Working Model of Drainage Cleaning Mechanism*

The drain cleaner machine removes sewage waste using a motor-driven chain and sprocket system. Lifters attached to the chain collect debris like bottles and plastics, dropping it into a collection bin. Water flows through lower grids while the waste is lifted by lifters' teeth. The prototype faces challenges such as hydrodynamic resistance and sediment accumulation. A mechanical grate with movable rakes and wedge-shaped rods helps simplify maintenance and improve filtration efficiency by addressing these issues.

- *Components*

Table 1 Components

Component Name	Material	Function
DC Motor	Copper (wiring), Steel, Plastic	Converts electrical energy into mechanical rotation.
Battery	Lithium-ion, Nickel, Lead-acid	Supplies electrical power to the motor.
Chain Drive	Steel	Transfers rotational motion from the motor to the shaft.
Shaft	Steel,	Transmits rotational motion to other parts like lifters.
Lifter	Stainless Steel,	Lifts and carries waste material from the water.
Collecting Bin	Stainless Steel	Stores the waste collected by the lifters.
Frame	Steel,	Provides structural support to hold all components.

- *Future Scopes*

✓ Time required for cleaning per meter of waste can be increased.
✓ Automatic speed regulator can be introduced.
✓ Solar based battery can be used.
✓ Only bucket and belt can get into drainage from open doors.

III. CONCLUSION

The Water Surface Garbage Cleaning Mechanism is a valuable solution for preventing blockages in drainage systems by separating solid waste from water. It functions through continuous chain rotation, which enables the lifter to collect debris and avoid blockages, especially during heavy rains with high water flow. By efficiently removing solid waste, it also aids in treating and converting it into degradable material. The lightweight design allows for easy installation at frequently blocked junctions, improving drainage flow and reducing flooding risks. This system significantly reduces manual effort, cuts maintenance costs, and extends the lifespan of drainage systems, making it beneficial for both residential and commercial use. Despite some limitations, such as limited reach and requiring trained operators, the machine is an efficient, cost-effective, and environmentally friendly tool for maintaining clean drains and ensuring the safety of infrastructure.

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