International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

Theoretical Analysis of Mobile Garbage Cleaner

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Abstract: ***We would like to throw some light on the New and Innovative concept which is known as "Mobile Garbage Cleaner". Mobile Garbage Cleaner is a new concept that is fully examined theoretically successfully. In world, waste production has doubled over the past 20 years. By 2050, the world may produce huge garbage at an alarming rate of 5 billion tons per year. Poor waste management in many developing or under developed countries is a threat to humanity& ecosystem. We propose a community sourced, data-driven, sustainable & economic solution to the garbage problem. In this theoretical analysis, we have found the effective way to make our nation, "A Clean Hindustan "in association with "Swachch Bharat Abhiyan". The system integrates the mechanism to uplift the garbage on roadside anywhere in cities or any other areas with the help of Vacuum Pressure & shifting it to incineration chamber will burn the garbage to ashes instantly making the surroundings clean & rid of stinky smell. The exhaust so obtained will be made eco-friendly, pollution free, and harmless. Not only roadside garbage, but large heaps of garbage collected on outskirts of city can also be cleaned effectively. Thus, reducing soil pollution. The whole system is designed to get maximum efficiency of work & zero pollution emission to make our environment safer. In under developed countries, waste management usually accounts for about 30-50% of municipality operational budgets. Despite these high expenses of corporation, many cities collect only 50-80% of wastes generated in the city. In some cities, 80% of garbage collection and transportation equipment is out of service or in need of immediate repair or maintenance, in absence of which the whole system may get worse.***

Keywords: Vacuum Pressure , Motor , Incineration Chamber , Briquette , Heavy Duty Batteries , Copper Plates , Steam , Exhaust Fan , Operating Panel , E – Vehicle , Solar Panels

1. Introduction / Detailed Description of the Integrated System

In this project, we are trying to give the integrated system for waste management in engineering concepts & techniques that would readily help in efficient disposal of garbage lying openly on roads & on streets. Our vehicle would also run electrically on heavy duty batteries thus producing zero carbon emission.

In this system, the garbage will be picked through vacuum pressure as the setup for it will be already installed in it. Approximate pressure for the purpose can be taken as 2 bar. Heavy metal objects will not be picked as it is non-biodegradable. The material which rotten & pollutes the environment by its foul smell is taken into consideration. The garbage so lifted will be transferred to garbage storage chamber, which may be approximately can hold 50 kg waste (extendable), where it will face steam which would absorb the moisture of garbage lumps & make it little drier. The copper plates installed in the chamber will help in the breakage of larger lumps.

The motor thus installed here at this stage will uplift the garbage to incineration chamber with the help of a pipe line where it will be dried further due to heat in the chamber. The copper plates again installed here will help in breakage & make the garbage finally to small pieces so that it can burn easily & also the burning of garbage will start to take place at this stage. Thereafter it will be burned down to ashes.

Briquette will be used in ignition / burning chamber to make the fire & temperature work on. Briquette will be inserted in the burning chamber. Later on ash will be disposed off from ash pits after burning the matter and cooling with the atmosphere air. The water jacket surrounding the incineration chamber would absorb additional heat to prevent of any accidents and will ensure the safety of driver & vehicle too. Small plastic fans will be installed in the water jacket to continue & accelerate the movement of water in it. The additional steam & exhaust combinely will be blown off by pipe which will pass through air cleaning scrubbers & pollutant removal system to clean the air. It will remove the harmful gases or pollutants from it. Thus the clean air will be released in the atmosphere. It will readily help in reducing the air pollution level. The solar panels will be installed on roof top of vehicle for energy backup.

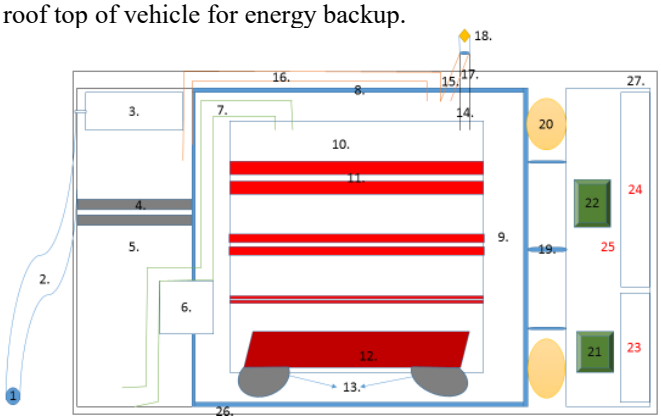

Figure 1: Detailed Theoretical View of Mobile Garbage Cleaner

1) Pipe opening to pick garbage through Vacuum Pressure.
2) Passage (pipe) to uplift garbage into container in Vehicle.
3) Vacuum Pressure setup.
4) Copper Plates to divide the large garbage lumps.
5) Garbage storage in presence of steam to absorb its Moisture.
6) Motor to uplift the garbage to Incineration Chamber.
7) Passage (pipe) to uplift garbage into Incineration chamber.
8) Insulated coating on outer side to prevent seepage of water out of jacket.
9) Water Jacket surrounding the incineration chamber to absorb additional heat.
10) Incineration Chamber.
11) Copper Plates to divide the large garbage lumps.
12) Copper plate acting as electrical source enriched from Heavy duty batteries.
13) Ash pits
14) Exhaust Outlet
15) Additional Steam Outlet
16) Pipe carrying Steam to garbage storage chamber.
17) Pipe combinely carrying (Exhaust + Additional Steam) in environment.
18) Air cleaning scrubber.
19) Shaft combining front & rear part of vehicle.
20) Exhaust Fan
21) Driver seat
22) Operator seat
23) Driving panel
24) Vehicle integrated system operating panel.
25) Driver – Operator Chamber.
26) Medium capacity Water Storage Tank on roof of vehicle.
27) Solar panels installation on roof of vehicle for energy backup.

The exhaust fan may be installed in the system if needed somewhere. The system operating panel will also be in set-aped in driver's chamber only for ease of working for both the men. It will be a pleasant way of working which will get the work done smoothly. Not only air pollution, this integrated system will also help in curbing the soil pollution level that will surely help in increasing soil fertility level.

The vehicle will be completely runned on electrical battery system. Thus it can be an innovative step taken in the history of waste management & disposal system.

2. Background of the System

One of the major issues in the 21st century is garbage dumping & waste management. People using various utilities care little of proper waste disposal. Using the existing technologies, we have designed the integrated system to destroy the waste at an instant at a place saving many other costs.

We just tried to move this discrepancy using engineering & electrical methods incubating modern scientific techniques into it.

3. Objective of the Integrated System

1) To reduce / abolish garbage from the society
2) To reduce air pollution
3) To maintain air level & standards
4) To control air borne diseases in humanity
5) To get multiple output benefits
6) To make easy setup to work on efficiently
7) To reduce the soil pollution

4. Field of the System

Our integrated system belongs to **Social Engineering field**. Waste management is a major issue in today's era, keeping in mind the same we framed & examined the system to put forth "**Mobile Garbage Cleaner**".

It would readily help the ways out to deal in with the existing garbage disposal techniques & waste management system.

5. Summary of the Integrated System

5.1 Vacuum Cleaner Setup

The dirt is collected by either a dust bag or a collection storage area. Huge stationary industrial vacuum cleaners can handle several hundred litres of dust before being emptied.The suction pressure is the maximum pressure difference that the pump can create.

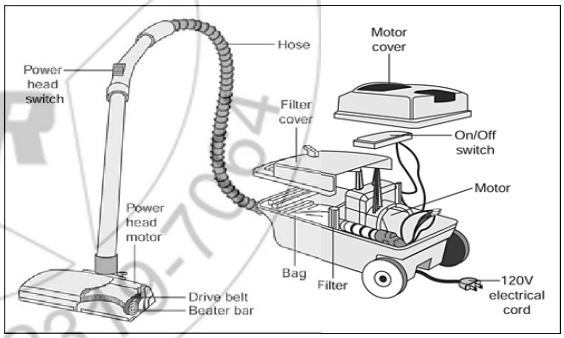

Figure 2: Vacuum Cleaner assembly & working prototype.

The higher the suction rating, the more powerful will be the cleaner. For our motive, we can use a vacuum cleaner of having a pressure of at least 2 bar to lift up the dirt or the garbage particles.

This technology will reduce the labour force & in a single time installation, it will have long term benefits in both technological advancement & financially.

5.2 Motor

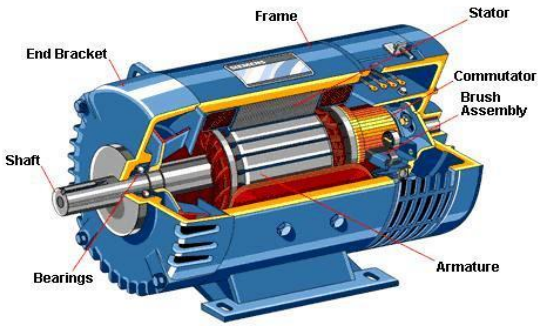

Figure 3: Motor Assembly& Working

A **Motor** is a rotary electrical machine that converts direct current electrical power into mechanical power.

A Motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. The Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills.

In our motive, again motor will be helpful to uplift the garbage bumps to incineration chamber that would get us rid of labour force & foul smell.

5.3 Copper Plates

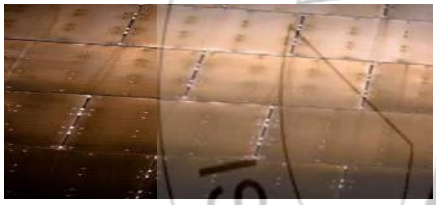

Figure 4: High conductive copper plate

Copper plates being a good conductor can easily conduct heat & electricity, which will be readily helpful in increasing overall efficiency of system.

Also copper plates having adequate strength, can withhold the capacity to bear the load of garbage. Due to its conduction property, once it is heated to a sufficient temperature, it will itself start working as a heat source and will provide a suitable atmosphere for the process.

5.4 Briquettes

Figure 5: Burning Briquette

A **briquette** is a compressed block of coal dust or any other combustible materials such as charcoal , sawdust , wood chips , peat , or paper used for fuel and kindling to start a fire.

It can mainly be collected from the remote areas and can be compressed in a solid form to have a burning efficiency. It is also prepared from waste material only, so there is no question of any wastage, in fact the waste material in turn will be reduced all over.

5.6 Ash Pits

Figure 6: Ash pits to collect Ashes

It is the place where ash is collected after burning the material. Ash pits are made from fire-resistant materials so that fire from the ashes does not reach flammable materials. Most ash pits have clean-out doors near the chimney for removing the old ashes from the pit.

For our motive, using ash pits will again give a soothing work load. Each time it's not necessary to empty the same but can be emptied periodically.

5.7 Heavy Duty Batteries

Figure 7: Exide heavy duty battery

Heavy Duty Batteries have a high source of potential voltage to serve the purposes. It can give long working hours to fulfil the needs. Nowadays it's being effectively used to run heavy vehicles.

5.8 Insulation Plates

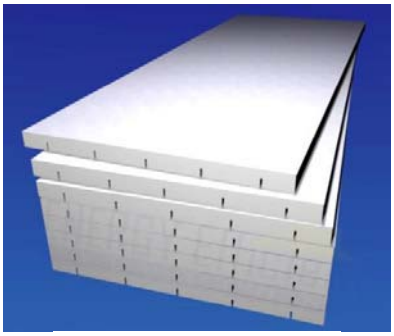

Figure 8: Insulation Plates

Metal Insulation Plates are used to mechanically attach insulation. The plate's circular design and reinforcing ribs provide exceptional strength to resist wind uplift forces. Metal Insulation Plates are made of coated steel for excellent corrosion protection that meet the requirements of ASTM D 6294, FM 4470 and DIN 50018. Metal Insulation Plate has a flat bottom.

5.9 Air Cleaner

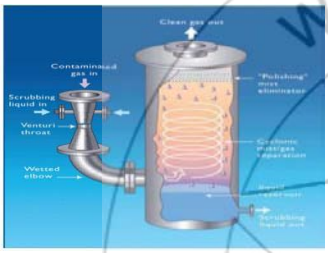

Figure 9: Air (Exhaust) cleaning prototype

An **air purifier** is a device which removes pollutants from the air. The commercially graded air purifiers are manufactured as either small stand-alone units or larger units that can be affixed to an Air Handler Unit (AHU) found in the medical, industrial, and commercial industries. Air purifiers may also be used in industry to remove impurities such as CO_2 from air before processing.

It can be of high commercial use in our motive to clean the exhaust air releasing no of toxic pollutants and the clean air can be released without any harm in the environment.

6. Advantages

Using this technology one can get the following benefits:

- Will help in increasing the air quality
- Reduce / abolish waste
- Easy to use
- Economic & effective
- Single time installation cost

7. Applications

- It can be used in garbage dump yards to clean the filthy dirt off there.
- Roadside garbage can be cleaned of efficiently & the streets of cities can regain its glory.
- Small scale installation anywhere as required, mainly in small scale industries or workshops.
- Near sea port units to treat the garbage at an instant.
- In industries, etc……..

8. Results

Using the above explained integrated system, many costs can be optimized effectively such as labor cost etc. Also people this days avoid working in stinky places & foul working conditions. This problem can be effectively neutralized and the work of cleaning can be done in efficient manner. The waste will be treated off and we can be ensured to get a cleaner environment.

It will be very beneficial for all living organisms & ecosystem. In addition to, the problem of soil pollution can be minimized to an effective extent and proper disposal of waste at time will ensure the harmony in society.

9. Conclusion

It is concluded that the waste will be treated and vanished off in above laid criteria's effectively with less loses & higher outputs of work. The waste will be drained off. We can even take a step forward to reduce & curb the soil & air pollution.

Designing a system to be introduced effectively into an existing, socioeconomic structure is a challenging practical hurdle. Will communities actually accept and use our integrated system. We believe a well-designed service has the potential to minimize authorities work pressure and allow for efficient municipal services in developing countries, whether it be for the purpose of garbage collection, garbage removal or ensuring a suitable & beneficial environment for residents.

10. Acknowledgement

We are thankful to our Institute "Rajarshi Rananjay Sinh Institute of Management & Technology, Amethi "for encouraging us to explore ourselves. The Incubation Centre of the Institute. Is a beehive of intellectual and innovative activities? Under the excellent & effective guidance of our faculty from Mechanical Engineering Department, Mr. Awadhesh Kumar Yadav Sir, we have completed the theoretical analysis on the "Mobile Garbage Cleaner" which focuses on the complete disposal of the roadside lying garbage in cities.

Our Institute has always focused on providing us a framework for better future for mankind. Also in shaping us to become effective, skilled professionals in coming future. I am very thankful to the Institute's Management& our Director Sir for his influential leadership

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