

DESIGN AND DEVELOPMENT OF TWO STAGE DEBRIS DISPOSAL SYSTEM

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Abstract - The term "Two Stage Debris Disposal" includes such items as kitchen waste, polythene, plastic, crockery, paper and also organic waste such as plant leaves etc. Which are discarded as debris. In the present scenario. The country India faces many problems related to wet garbage. Prime Minister of India started campaigning mission "Swachh Bharat Abhiyan" in 2 oct 2014 for awareness to keep surrounding neat and sanitized. The India has a large proportion of population living with high standards. The India has large number of shops, hotels, restaurants, malls, airports and private as well as government offices. The India has an enormous floating population including migrants. This generates a large amount of debris. This can be dispose in two stages by using shredder mount inside the grinding chamber unit in first as well as second stage. This makes bits of debris into paste. Hence increase the decomposition rate. It can supply either in biogas plant or canal.

Keywords - Garbage Disposal, Debris Disposal, Garburator, Decomposer.

I. INTRODUCTION

In most Indian cities, both small and large, waste disposal is a large problem. The India has large number of shops, hotels, restaurants, malls, airports and private as well as government offices and enormous floating population including migrants. This generates a large amount of debris. Its creating public health, sanitation and environmental problems [7].

The improper disposal of municipal waste is a serious and dangerous impact on a wide range of areas. Garbage thrown in the street or creates a public health hazards, while waste dumped near rivers, lakes and streams contaminates the water supply. Rubbish that is the open rather than disposed of properly creates pollution and release toxic fumes into the environment. Non-biodegradable materials through into open drains make their way into the sewerages system, clogging pipelines and damaging infrastructure. the hazards posed by the dumping of untreated hospitals and industrial waste even greater, with the release of pathogens and toxic compounds posing a grave threat non-just to human life but also to plants and animals. Garbage dumped in the countryside is not simply an eyesore, entire landscapes are ruined and unique habitats for flora and fauna are lost. All of these problem is common in India, where vast quantities of solid waste remaining controlled in the streets, along major roads, in empty plots of land, downhill slopes and in illegal dumps.

II. OBJECTIVES

- 1) Reduce the volume of the solid waste through implementation of waste reduction and recycling programs.

- 2) Help to handle the environment problems and waste management.

III. PROBLEM DEFINITION

A garbage disposal chews up food scraps that are fed down the drain with a heavy flow of water. The disposal, mounted to the underside of the sink drain, has an electric motor that is either hardwired or plugged into a 120-volt box or receptacle, usually located at the back of the sink cabinet [7].

Inside the garbage disposal in what is called the grinding chamber, shredding blades break down the food, and then an impeller arm and plate force the particles and liquid down the drain. Dishwasher drain water also runs through the garbage disposal so that any large particles are ground up before they reach the drainpipe.

Two types of garbage disposal are commonly available: the continuous-feed type, activated by a switch as you run the water, and the batch-feed type, activated by turning a stopper after loading the disposal with garbage.

Most garbage disposals fit the standard drain outlet. Local safety codes may determine the distance the switch must be located from the sink—the farther away, the safer.

IV. NEED OF TWO STAGES

- 1) This can be dispose in two stages and makes bits of debris into paste. Hence increase the decomposition rate. It can supply either in biogas plant or canal.
- 2) Compactness will be increase with decrease volume of debris efficiently so, reduce the amount of waste going to landfill.

V. LITERATURE VIEW

1. The garbage disposal was invented in 1927 by John W. Hammes, an architect working in Racine, Wisconsin. He applied for a patent in 1933 that was issued in 1935 USA [1].

Title: GARBAGE DISPOSAL DEVICE

Inventor: John W. Hammes

Register Patent: US2012680 A John W Hammes

Source: <http://www.google.co.in/patents/US2012680>

- Specific Problem Solved / Objective of Invention: This invention relates to comminuting devices for the disposal of kitchen waste material or garbage and, as one of its objects, aims to provide an improved device of this kind which is of a relatively simplified construction but which will be very efficient and reliable in operation.
- Brief information: Garbage disposal device: This invention appertains to garbage disposal devices and more particularly to a novel attachment for kitchen sinks whereby the garbage can be delivered directly to the drain and sewer pipe. As the same is taken from the table, etc., thereby eliminating the necessity of keeping the garbage in cans for collection with the contingent inconveniences.

2. After independence of India there are only one method we use for garbage disposal that is municipal waste disposal system. Municipal Solid Waste Management by Government of India is published manual information book in every year with purpose of URBAN DEVELOPMENT.

Title: Municipal Solid Waste Management by Government of India

Publisher: Government of India with heil of Ministry of Urban Development.

3. Also, Advance countries like US, UN, Japan etc. develop the GIS based transportation modals for garbage disposal.

Title: GIS-based approach for optimized siting of municipal solid waste landfill.

Publisher: V.R. Sumathi, Usha Natesan, Chinmoy Sarkar

Source: Centre for Environmental Studies, Department of Civil Engineering Anna University, Chennai 600 025, India. www.sciencedirect.com

4. We referred mechanical engineering projects (mechanicalengineeringprojects.com)

<https://www.mechanicalengineeringprojects.net/garbage-disposals-what-are-they/2017/>

Garbage disposals are machines that grind food wastes into pulp. They are mostly used in the United States of America and are rarely seen anywhere else in the world (maybe Canada). It basically consists of a motor, an impeller, a grinding ring and cutters (usually swivel type) attached to the impeller. It doesn't use any kinds of blades, instead, when the impeller rotates the particles grind against the

grinding ring which is fixed to the wall of the grinding chamber. The swivel cutters also help the grinding process. Given below is a video which you can refer to see how a garbage disposal work; Garbage disposals are attached to kitchen sinks. The food that is ground goes along with the water from the sink to the waste disposal area, which is a septic tank in these cases. Water has to be run continuously during the operation of most of the disposal for its smooth working.

5. Evaluation of food waste disposal options in terms of global warming and energy recovery: Korea [2]

Publisher: Mi Hyung Kim, Han Byul Song, Yuleum Song, In Tae Jeong and Jung Wk Kim

Source: Kim et al. International Journal of Energy and Environmental Engineering 2013, 4:1

<http://www.journal-ijeec.com/content/4/1/1> in SpringOpen.Journal

Published: 9 January 2013

Brief Description: -

This study evaluated three food waste disposal systems: anaerobic digestion, co-digestion, and incineration of dried food waste, using LCA from the perspective of global warming and energy/resource recovery. Since landfilling of food wastes was banned in 2005, animal feeding and composting have been the major practice for treating them, and anaerobic digestion and co digestion were the minor ones. Incineration is an available method for energy recovery from municipal solid wastes. Incineration of raw food waste has been practiced for increasing the heating value in a few local governments in Korea; however, it provokes a lot of controversy because of much moisture and salinity constituent. The three scenarios were evaluated though they are not major disposal methods in Korea because we concentrated in energy recovery from food wastes to suggest alternatives.

6. The role of waste management in the control of hazardous substances: lessons learned [3]

Publisher: Henning Friege

Source: Friege Environmental Sciences Europe 2012, 24:35

<http://www.enveurope.com/content/24/1/35> in SpringOpen.Journal

Published: 21 November 2012

Brief Description: -

Though there are no complete balances for both groups of compounds serving as examples, some conclusions can be drawn based on the experiences collected. Hazardous compounds may be separated successfully from used products or waste.

- If they are mostly used in industry and not in households,
- if they can be identified as part of certain products,

- if their concentration in these products is rather high,
- if technical problems come up when they contaminate secondary raw materials,
- if there is international support for proper waste management.

7. Solid waste as renewable source of energy: current and future possibility in Algeria [4]

Publisher: Boukelia Taqiy Eddine* and Mecibah Med Salah

Source: Boukelia and Mecibah International Journal of Energy and Environmental Engineering 2012, 3:17

<http://www.journal-ijeee.com/content/3/1/17> in SpringOpen.Journal

Published: 31 August 2012

Brief Description: -

This paper gives an overview on the Algerian potential of solid waste including MSW, ISW, and HW as biomass sources. The management of solid waste (MSW) and valorization is based on the understanding of MSW composition by its categories and physicochemical characteristics. Energy from waste is not a new concept, but it is a field which requires a serious attention. There are various energy conversion technologies (thermochemical, biochemical, and mechanical extraction) to produce useful products (electricity, heat, and transportation fuel). In general, the government should, first and foremost, implement its own decisions and work towards encouraging independent renewable energy producers, in general, and energy generation by WTE technologies, in particular. By doing so, the overall energy generation capacity will increase, the dependence of Algeria on imported fossil fuels will be reduced, and a significant reduction in pollution and greenhouse gas emissions will occur.

8. Renewable municipal solid waste pathways for energy generation and sustainable development in the Nigerian context [5]

Publisher: Olaleye M Amoo1* and Richard Layi Fagbenle2

Source: Amoo and Fagbenle International Journal of Energy and Environmental Engineering

2013 <http://www.journal-ijeee.com/content/4/1/42> in SpringOpen.Journal

Published: 27 Nov 2013

Brief Description: -

The continued concerns over energy prices, increase in population, and climate change issues have led towards a need for alternative and new energy sources. Municipal solid waste (MSW) is generally accepted as a renewable energy resource. This research study presents a techno-economic assessment potential to utilize the energy obtainable from MSW for the generation of electrical power. The assessment was carried out for energy generation

by thermochemical (incineration or combustion) and biochemical (landfilling and anaerobic digestion) processes and based on the available data from seven selected municipalities. Due to the broad scope of this topic, life cycle impact of waste management, social acceptance, policy aspects, and emission reduction or fossil fuel offset are not considered and are not part of the assessment. Results presented in tabular form indicate, for example, that the price of steam generated by a fluidized steam generator is in the range of US\$0.018/kWh t (Lagos) to US\$0.044/kWh (Nsukka) and compares favorably with the typical cost of steam at US\$0.015/kWh. Electrical power generation using a combined heat and power plant provides electricity at a cost that is in the range of US\$0.017/kWh e (Lagos) to US\$0.040/kWh e (Nsukka) and also compares well with the typical cost of electricity in Nigeria at US\$0.14/kWh e (as of 2012).

9. Management and Disposal of Municipal Solid Wastes in Abakaliki Metropolis, Ebonyi State, Nigeria [6]

Publisher: Patrick Akata Nwofe

Source: International Journal of Scientific Research in Environmental Sciences, 3(3), pp.

0107-0118, 2015 Available online at <http://www.ijsrpub.com/ijrsres>

Published: 26 February 2015

Brief Description: -

Management and disposal of solid waste in Abakaliki metropolis has been investigated and the findings show that the municipal solid wastes are mostly composed of the biodegradability and non-biodegradable materials. The study further revealed that the agency responsible for the evacuation of these waste do not do that on a regular basis. It was also observed that the present waste disposal situation is expected to worsen due to rapid urbanization in the state, increase in unplanned settlements and housing, and lack of sustainable waste management technologies in Abakaliki metropolis. The major proportion of the wastes emanates from the residential sectors and recycling are not currently practiced formally in the metropolis. The consequences of the poor waste management are manifested in environmental degradation, road encroachment, air pollution, residential land encroachment and loss of aesthetic view of the metropolis. The findings and suggestion presented in this work will serve as useful guide for improved waste management services within the metropolis and regions with similar waste challenges in Nigeria and other developing countries.

10. Sustainable Solid Waste Management in India [7]

Publisher: Ranjith Kharvel Annepu

Source:

Published: January 10, 2012

Brief Description

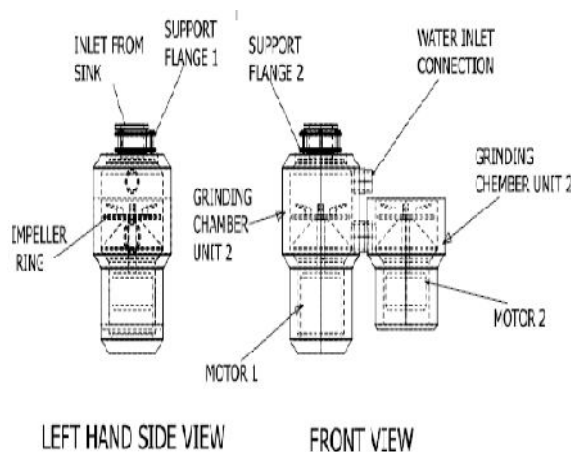
The success of recycling in India depends upon leveraging the advantage India has in the form of informal recycling sector. There is a world-wide consensus that the need of recycled materials will spike in the next decade. The informal sector should be ready to meet this demand. This also increases opportunities for private companies which can aggregate large amounts of waste to supply in bulk. Prevalence of one of these or co-existence depends upon the quality of the product and the quantity (bulk) they can supply.

- Informal Sector should be integrated into formal system;
 - Compost from MBT should be used as landfill cover/ cash crops/ lawns;
 - RDF and WTE for the rest of the waste from MBT plants; and
 - Majority source separation should be the target of Municipal corporations.
- Solid Waste Management, its impacts on public health and environment, and prospects for the future should be further researched. The findings should be disseminated into the public knowledge domain more effectively.

VI. FUNCTION OF THE COMPONANETS



Fig.1 Two Stage Debris Disposal Model



Sr No	Name of the part	Sr No	Name of the part
1	Sink	12	Tilt Drain Chamber
2	Syphon Breaker	13	Drain Chamber
3	Control Section	14	Electricity Connection
4	Flow Control Valve	15	Outlet
5	Shut off Valve	16	Stop Switch
6	Cold Water Supply	17	Thrust Opening
7	Incoming Electrical Supply	18	Shredding Element
8	Water Inlet Connector	19	Heavy Cling Bearing
9	Disposal	20	Bearing
10	Grinding Chamber Unit 1	21	Double Heavy Duty Motor
11	Grinding Chamber Unit 2	22	Aqua Saver Sensor

Table 1. Components of Disposal

1. SINK with STOPPER: -

Stainless steel kitchen sink is used in hygienic condition. It is used for washing hands, dish washing & other purposes. Stopper is placed on outlet throat of sink. Its purpose to close throat when required.

2. SYPHON BREAKER: -

Siphon breaker valve is used for submerging the outlet of discharge pipe, the pump static head is reduced simply to the difference between sump water level and the discharge surface water level. It is control of back flow.

3. FLOW CONTROL VALVE: -

Controlling of the flow of water.

4. SHUT OFF VALVE: -

It's shut inlet of water to the actual system.

5. DISH WASHER INLET WATER CONNECTION: -

It is optional actually which is used when system get clogged then it is provide extra water.

6. DISPOSAL GUARD: -

It is a guard which is used to support all the element of a disposal system and also absorb disposal sound.

7. GRINDING CHAMBERS ELEMENTS

7.1. STATIONARY SHREDDER: -

This shredder is wall of grinding chamber and different jaws are provided on wall surface which helps to cut a garbage.

7.2. ROTATING CHAMBER: -

This shredder is directly mounted with electrical motor. It is rotate and also produce centrifugal force which is help in cutting action. It has mainly 2 to 4 jaws and small though holes on surface of grinding ring. This hole helps it drain out all pulp of garbage.

8. DRAIN CHAMBERS

8.1. DRAIN CHAMBER: -

This element is created slightly tilt like 4-5 degree. All pulp is collecting in drain chamber. Because of tilt all garbage will automatically flow of the second grinding chamber for cutting action.

8.2. DRAIN CHAMBER OUTLET: -

Throat opening outlet help to all paste of garbage will disposal to the canal.

9. THROAT OPENING: -

This is placed in between first stage to second stage.

10. STOP SWITCH: -

stop switch is applicable when equipment under maintenance and its color is red.

11. BEARING: -

Bearings used which are self-lubricated ball bearing.

12. DURABLE HEAVY-DUTY MOTOR: -

Commercial food waste disposer with motor which have range half horse power. Mainly three phase brushless electrical power 230 volts, 50 Hz, 8.1amp and 1750 rpm.

13. FLANGE: -

Flange is connected one side with the kitchen sink and other side with disposer for holding and supporting.

14. MISCELLANEOUS PARTS: - [8]

Screws, washers, gaskets, wirings etc.

15. AQUA SENSOR: -

Aqua sensor will sense all kind of water flow, quantity & control as per requirement.

Specification of the Two Stage Debris Disposal, General specification of two stage debris disposal system.

I. Types of feed: - continuous two stages

II. On/off control: - wall switch

III. Motor: - three phase

IV. HP: - 1

V. Volts: - 230

VI. RPM: -1750

VII. Hz: -50

VIII. Amp: - 8.1

IX. Time rating: -intermittent

X. Lubrication: - permanently lubrication upper & lower bearing

XI. Weight(approx.): - 10.5 kg

XII. Overall height: - 14-1/4"

XIII. Sound seal: - anti vibration mount

XIV. Multiple grind: - grind shear ring grind chamber

XV. Capacity: - 24 oz.

XVI. Average electrical usage: - 3-4 KWH per year

Sections, sub-sections and sub-subsections are numbered in Italic. Use double spacing before all

section headings and single spacing after section headings.

CONCLUSION

Two stage debris disposal system is mainly focuses on how to reduction in pollution of environment which is mostly occurs in water and land. It will create health related problems. So, two stage debris disposal system grind this garbage in close two stage system and makes it in the form of bits. Hence it will increase rate of decomposition and used for Biogas plant. So, two stage debris disposal helps to dispose a garbage without environment and health issue.

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