



Solid Waste Disposal Patents

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ABSTRACT

In this paper six innovations are projected as solutions to lingering problem of waste plastic disposal and recycling. The two apparatus projected are for melting the waste plastic within our house. The two equipment projected are for melting food packaging of plastic in automobile and two wheeler using exhaust heat. The two composites of waste plastic, textile or dye sludge and waste or used cooking oil can be used for manufacturing construction blocks. Hence 6 innovations give solutions to the problems created by single use waste plastics.

Keywords: waste plastic, textile sludge, used cooking oil, composite, exhaust heat

1. Introduction

We know that only 10% [1,2,3] of 400 million tonnes of plastic [3] produced are recycled globally. Remaining 90% are indiscriminately disposed by humans, companies, etc. into waterbodies, landfills and into sea. Single use plastics are menace. Which are disposed into environment after single use. These plastics breakdown into micro plastics [4] and enter food chain affecting flora and fauna and finally humans. The harmful effects of plastics due chemical leaching, burning of waste plastics are well studied. Our scientists and innovators are coming up with solutions to the problems. But new innovations are necessary to increase the recycling percentage. Hence these four ideas proposed if implemented will definitely help in reducing the disposal of waste plastic packagings from houses and from passengers consuming ready to eat food stuff inside automobiles.

Textile sludge are hazardous wastes [5,6] generated during treatment of effluent from textile and dyeing industries. The sludge contains heavy metals, harmful chemicals. The sludge is normally stacked in open yards or sent to landfills. When rains happen, the chemicals and heavy metals in the dissolve and leach in to runoff, surface water and ground water. The people of Tiruppur [7] region in Tamilnadu are affected by the problems created by textile effluents and sludge. To mitigate the problem, researchers are adding the textile sludge to the cement concrete as substitution to the aggregates or as percentage of cement[8] or as polymeric encapsulation [9]. This paper proposes two new methods for utilization of textile sludge in the form of composite of waste plastic, waste cooking oil and textile sludge.

2. Description

2.1 At Home

2.1.1. An apparatus to melt plastic and a method thereof –Application number 202241007577 –Indian patent number -421961

This patent is an apparatus or vessel to melt the food/ cereal/ oil packaging plastics at home. This patent is simple to use and safe. The apparatus consists of funnel with sloped outlet. Two walled cylinder encasing the funnel helps in heat insulation and effective melting of plastic covers. The temperature sensor with LCD display in the apparatus shows a clear warning of rising temperature so that the flame in stove can be lowered or put off. This apparatus will encourage better solid waste management of waste plastic covers at house or home level and thus reducing environment damage. The field of invention is mentioned as Physics but the real application is solid waste management starting from house.

All dimensions in the drawing are in millimetres.

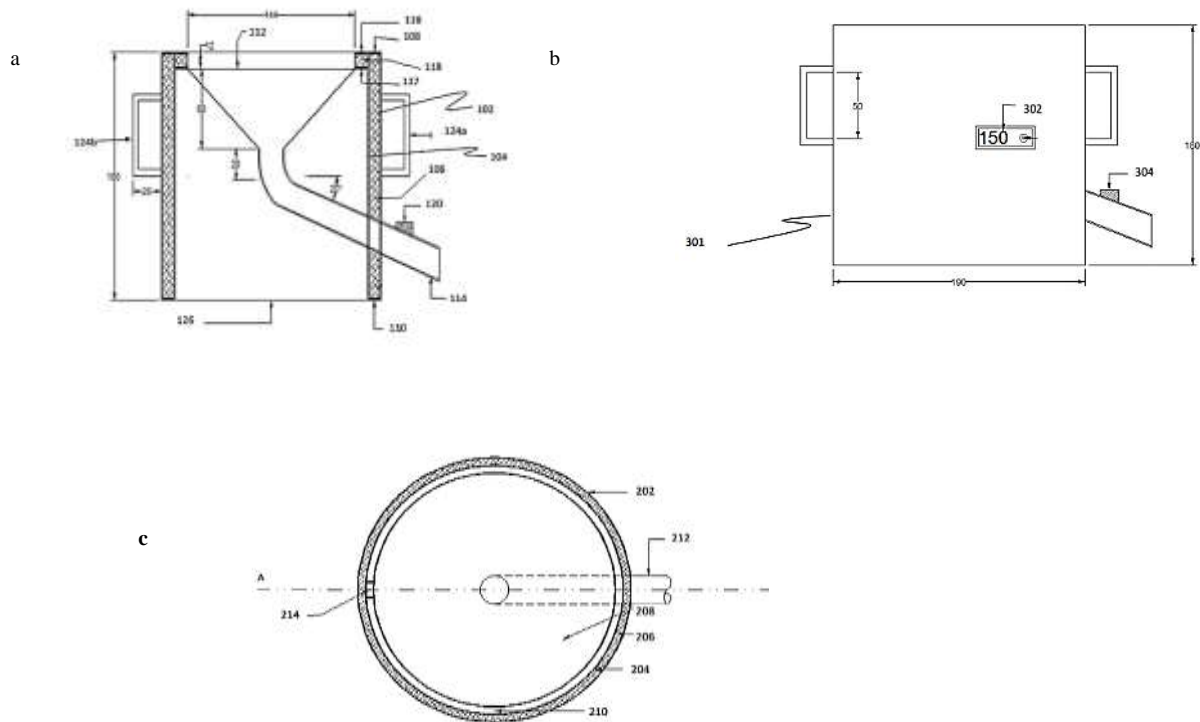


Fig-1 a – Cross sectional elevation, b- elevation, c - plan (Indian patent number -421961)

2.1.2 Low Cost AND Compact House Plastic Waste Melter- Application no -202041029627 – Published but Patent Not Yet Granted

The collection, sorting, dumping and recycling of carry bags and packing wrappers available in the houses becomes a tedious task for the government as they differ from plastic containers or bottles by their composition. These plastics create the environment pollutions when disposed of into the nearby landfills, road side or ponds or any water bodies.

This equipment uses a manual operated screw inside a metal tube. After 10 minutes of preheating of screw and tube, the plastic sheets fed through a hopper are pushed forward by the screw. These sheets are melted by a heating element which is placed around the metal tube and insulated by glass wool or asbestos. This molten output is converted in to blocks and sold to recyclers. This money is used to pay the electricity charges.

The main purpose of this equipment in to reduce the indiscriminate disposal of plastic sheets into the environment.

All dimensions in the drawing are in millimetres.

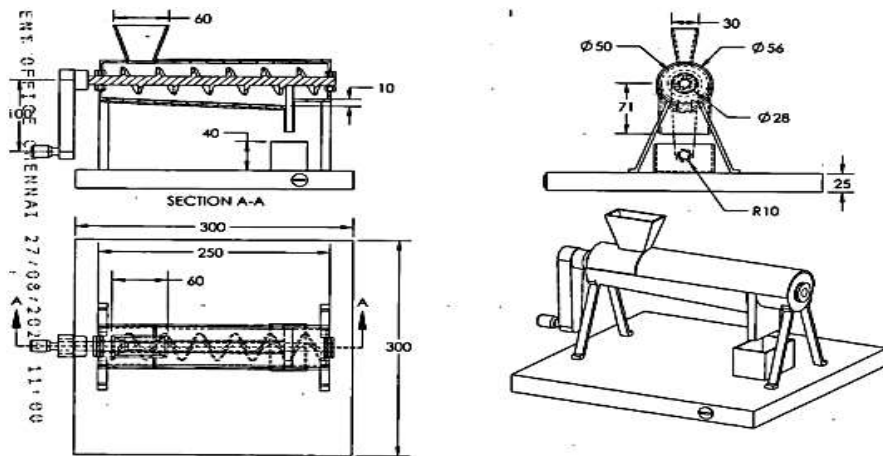


Fig-2 All views of melter (Indian Patent Application no -202041029627)

2.2 IN VEHICLES

2. 2. 1. A System And A Method For Recovering Heat Energy From An Automobile To Process Materials- Indian Patent No -429805

Description and Drawings

While travelling, we normally consume packaged foods and drinks. The plastic packaging covers of Polyethylene, polypropylene, PET, etc. are just discarded or thrown on roadside while travelling. This creates an unsightly scene along highways. This also creates environment problems damaging the soil, water, flora and fauna.

This patent can be used effectively for valorising the packaged food covers by melting them using convection method in the melting container. The molten plastic will be collected in receiver and turned into blocks. Both melting container and receiver are coupled to the exhaust pipe of the automobiles through copper pipes with heat transfer liquid. This solves the solid waste management problem of environmental engineering.

This patent can be installed in cars, trucks and buses, and safer disposal of these light weight PE, PP and PET food/ drinks packaging can be effectively handled, thus reducing the indiscriminate disposal and solid waste management problems along the highways.

The field of invention is mentioned as Mechanical Engineering. But as per above justification the application is related to environmental engineering or civil engineering.

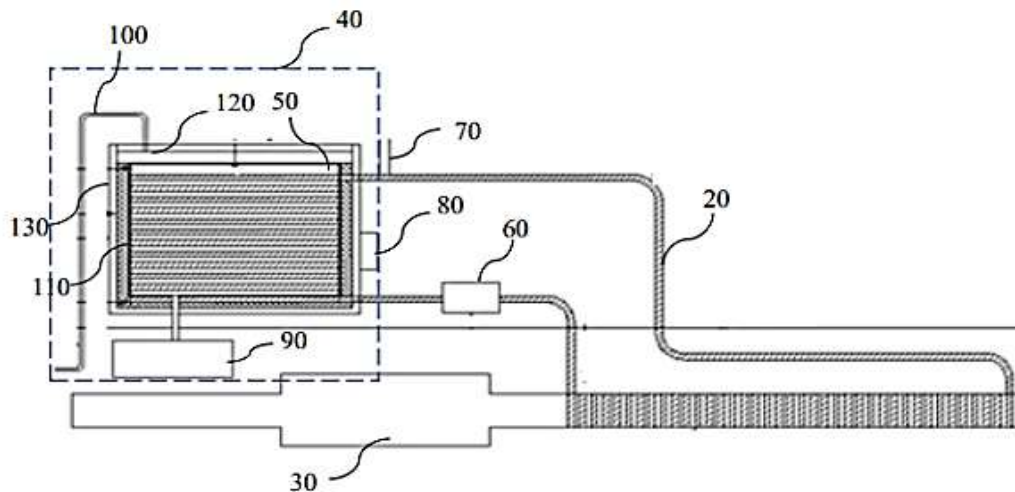


Fig-3 Automobile heat recovery apparatus (Indian Patent No -429805)

2. 2.2. A System and A Method for Repurposing Thermal Energy from A Vehicle To Process Materials - Indian Patent No -411119

Description and Drawings

While travelling, we normally consume packaged foods and drinks. The plastic packaging covers of Polyethylene, polypropylene, PET, etc. are just discarded or thrown on roadside while travelling. This creates an unsightly scene along highways. This patent can be used effectively for valorising the packaged food covers by melting them using conduction method in the melting container. The molten plastic will be collected in receiver and turned into blocks. Both melting container and receiver are coupled to the exhaust pipe of the 2 wheeler. The uniqueness of the apparatus is that, the receiver and container along with plates detaches itself automatically when the melting temperature exceeds 200°C and attaches to the heat transfer block when temperature reduces using temperature sensors and servo motor arrangement. This solves the solid waste management problem of environmental engineering. The patent claims were generalised to cover all applications including food processing or processing any other relevant materials hence field of invention is in food.

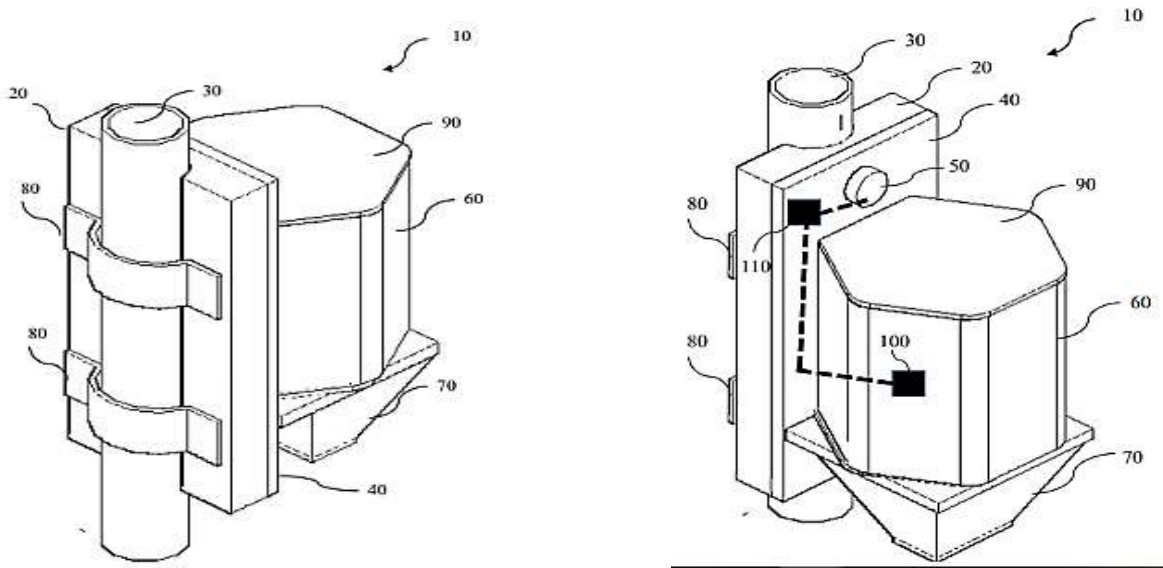


Fig- 4 – a - Front view

b- Back view (Indian Patent No -411119)

2. 3. USE OF PLASTICS IN CONSTRUCTION OR BUILDING COMPOSITE

2. 3.1. A Method for Synthesizing A Building Material – Indian Patent No- 413250

This patent envisions the use of two waste materials viz. waste plastic as binder and textile / dyeing industry sludge as inert filler in various ratios to create a composite that can be used to create solid blocks, hollow blocks, bricks, etc. Both waste plastic and textile sludge are wastes which remain unutilized in current scenario. This patent envisages additional avenues for utilization of waste plastic and textile sludge and thus reducing the waste management and environment problems created by the above two wastes. Even though the field of invention is polymer technology, the application is in civil engineering field.

The innovation covers an apparatus solely to manufacture the composite. The apparatus consists of a solar thermal system (220) used to heat the liquid to around 200°C for melting the plastic in the container (140) surrounded by liquid bath (280). The mixing motor (180,170,60), recirculating pump (240), temperature sensor and controller (260) are powered by Solar photovoltaic (190) and controller (250). This apparatus is a standalone system and can be used in any rural or urban area as it doesn't need any grid power supply.

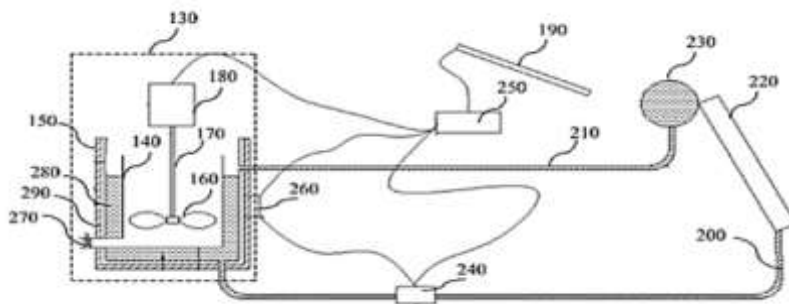


Fig-5 The apparatus for melting and mixing material (Indian Patent No- 413250)

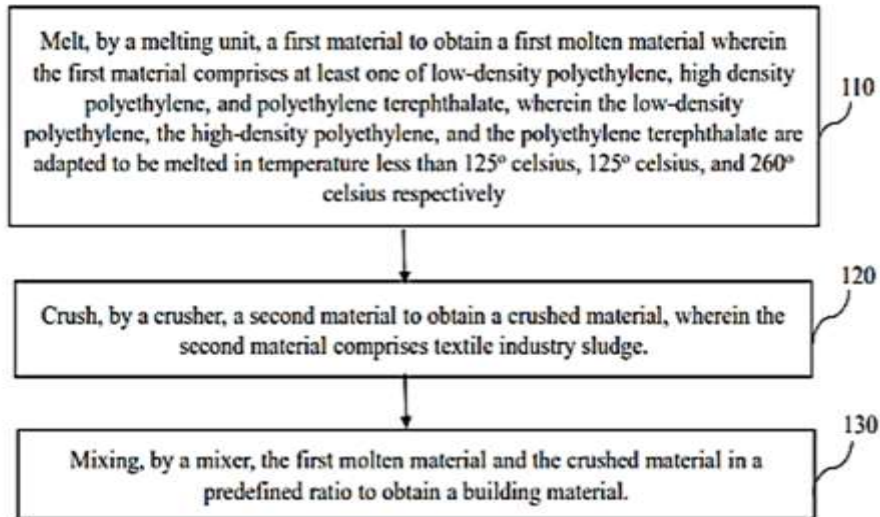


Fig-6 The Flow chart for melting and mixing material(Indian Patent No- 413250)

2. 3.2. Method for Synthesizing Construction Composite-Indian Patent No-437130 (Patent of Addition) [10]

The composite is obtained by mixing three waste materials viz. Waste plastic, waste or used cooking oil and textile/dye sludge in various ratios. Hence it has applications in construction and building blocks. And also reduction in environment impact due to the above materials. Hence it is a pure Civil Engineering related patent of addition.

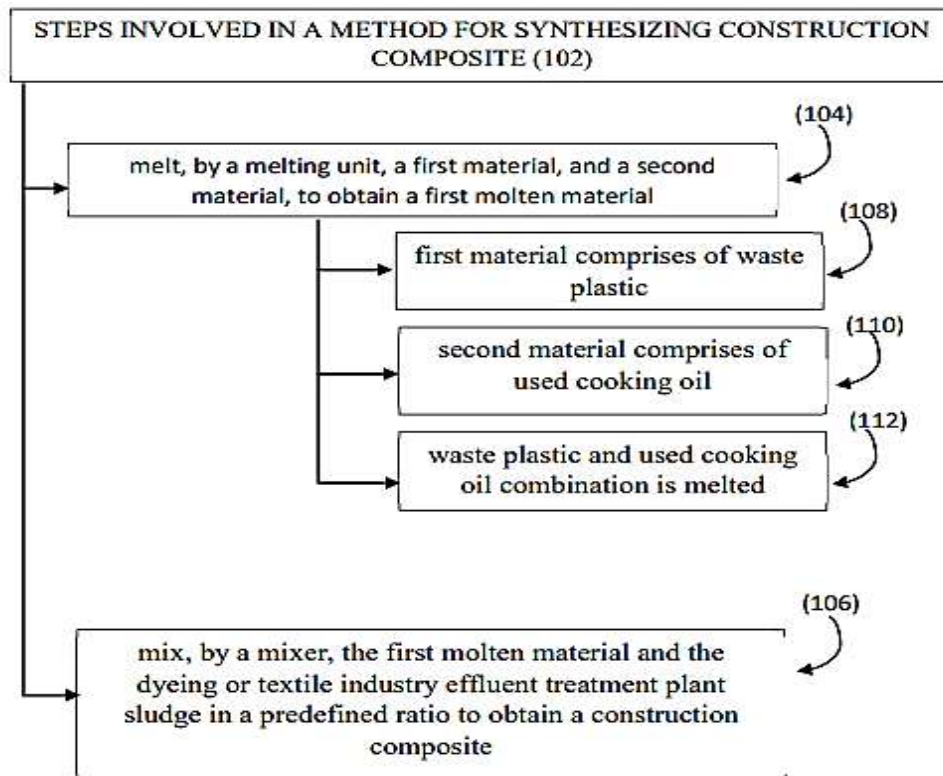


FIG. 1

Fig-7 The Flow chart for melting and mixing material(Indian Patent No-437130 (Patent of Addition))

Conclusion

Although many innovations and inventions are done in the field of collection, segregation and reutilizing the plastic waste, more innovations are necessary to increase the recycling percentage. The above ideas are for recycling, reuse or up-cycling of waste plastics and textile sludge and are innovative and hence patents were granted in India. The equipment and apparatus proposed will help to melt the light weight single use plastics and prevent disposal of single use plastics indiscriminately into the environment. These composites and equipment envisaged will reduce the wastes disposed in to the environment.

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