

**A PRODUCT FOR WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT RE-UTILIZATION
AND PROCESS THEREOF**

DESCRIPTION OF RELATED ART:

Discarded electrical and electronic devices become a prime source of Waste Electrical and Electronics Equipment (WEEE). WEEE normally contain chemical substances such as, for example, lead, cadmium, lead oxide, silver oxide, nickel-metal hydride, brominated flame retardants, toxic gases, toxic metals, Polychlorinated Biphenyls (PCB's), acids and plastics. These chemical substances, if not treated properly, are highly dangerous and hazardous to humans, plants and animals that greatly disturb the flora and fauna of the environment.

Various practices for E-waste disposal including but not limited to landfilling, incineration, soaking in open acid baths, magnetic separation and recycling are known. However, these procedures are not without pollutants such as obnoxious gas or greenhouse gas (GHG) emissions, emission of carcinogens or teratogens and leaching of chemicals into the soil and ground water. Also, these procedures are unsafe, time consuming, costly, requiring large amount of energy consumption and specifically need special machinery or skilled workers.

Efforts are being made for recycling E-wastes for utilization in various value added applications. For example, European patent, EP1428586 (A1) to Barker describes a method for the disposal of discarded electrical and electronic equipment. The method comprises steps such as, for example, dismantling the equipment as necessary, segregating the parts into those containing glass and other items, melting the glass parts and mixing all together to encapsulate the waste parts in the molten glass to form pebble shaped ingots. The ingots are then used as ballast or as a building aggregate.

In addition, few efforts are seen in the art for reutilization of WEEE in building construction. For example, M. Dondi et.al (2009, Waste Management 29:1945–1951) describes a process for re-use glass of TV and PC monitors in the manufacturing of clay bricks and roof tiles. The process consists of steps like clay grinding, mixing of clay, glass, and water followed by successive storage for 7 days. The process also discloses the steps of body preparation, shaping, drying, and firing through a simulation, on a laboratory pilot line, of the industrial processing of clay bricks and roof tiles. Reference may be

made to F Andreola et. al (2010, Second International Conference on Sustainable Construction Materials and Technologies) where in the Waste Electrical and Electronic Equipment (WEEE) glasses are used in construction sector as secondary raw material.

However, the methods or processes available in the prior art require heat or chemical treatment of wastes to make them suitable and sustainable raw material in building construction. Also, these methods normally include steps of extraction, re-cycling, shredding, segregation or disposing that are inefficient, costly, time consuming and non-environment friendly.

A simple, more efficient, non-polluting, environment friendly, expeditious process and apparatus for bulk E-waste treatment for sustainable environmental reutilization of E-waste and/or Waste Electrical and Electronic Equipment (WEEE) is needed.

BRIEF DESCRIPTION OF DRAWINGS:

The above mentioned and other features, aspects and advantages of the present invention will become better understood with regard to following description, appended claims and accompanying drawings, wherein like reference numerals refer to similar parts throughout the several views where:

FIG. 1 is a perspective view of a preferred embodiment of a WEEE (E-waste and/or Waste Electrical and Electronic Equipment) brick constructed in accordance with the present invention;

FIG. 2A is a top view of a first piece of the WEEE brick of FIG. 1 in a non-welded state;

FIG. 2B is a top view of a second piece of the WEEE brick of FIG. 1 in a non-welded state;

FIG. 3 is a front view of the first piece of FIG. 2A filled with an E-waste and a binder/filler material;

FIG. 4 is a perspective view showing a process of transforming the first piece of FIG. 2A into a first part;

FIG. 5 is a perspective view showing a process of transforming the second piece of the FIG. 2B into a second part;

FIG. 6 is a top perspective view of the first piece of FIG. 2A partially filled with the binder/filler material; and

FIG. 7 is a top perspective view showing a process of joining the first piece to the second piece to form the WEEE brick of FIG. 1.

I CLAIM:

1. A Waste Electrical and Electronic Equipment (WEEE) brick comprising:
a first part, the first part defined by a first piece, the first part adapted to be sequentially filled with at least two layers;
a second part, the second part defined from a second piece including at least two panels, the second part adapted to close the first part; and
the first part and the second part being coupled to define the WEEE brick.
2. The WEEE brick as claimed in claim 1, wherein the first part includes a first layer of a binder material.
3. The WEEE brick as claimed in claim 1, wherein the first part includes a second layer of a WEEE material adapted to be deposited on the first layer.
4. A Waste Electrical and Electronic Equipment (WEEE) brick comprising:
a first part, the first part defined by a first piece, the first part adapted to be sequentially filled with at least two layers;
a second part, the second part defined from a second piece including a single panel, the second part adapted to close the first part; and
the first part and the second part being coupled to define the WEEE brick.
5. A process for preparation of Waste Electrical and Electronic Equipment (WEEE) brick adapted to treat a bulk WEEE material for sustainable environmental reutilization, the process comprising steps of:
 - a) forming a first part and a second part of the WEEE brick from suitable material;
 - b) categorizing the WEEE material;
 - c) filling a binder/filler material in a predefined proportion inside the first part of the WEEE brick;
 - d) filling the categorized WEEE material in a pre-defined sequence and proportion inside the first part of the WEEE brick;

- e) allowing the binder material to settle, expand, cure and harden partially for a predefined amount of time;
 - f) closing the first part with the second part of predefined size to form the WEEE brick;
 - g) preparing outer surfaces of the WEEE brick by corrugating with furrows or punch marks;
 - h) coating the WEEE brick with a coating material; and
 - i) laminating with rubber material for aesthetics and corrosion prevention.
6. The process for preparation of the WEEE brick as claimed in claim 5, wherein the suitable material for forming the first part and the second part is selected from one or more of following mild steel, bronze, aluminium, metal, plastic, alloys, composites, clay, cement, fiberglass, ceramic and combination thereof.
7. The process for preparation of the brick as claimed in claim 5, wherein the binder material is selected from a group of epoxy resin, mortar mix, silicone sealant, reactive acrylics, polyurethanes adhesives, Reactive Hot Melt Polyurethanes (RHMUs), cyanoacrylates, polyvinyl acetates, hydrocarbon rubber based sealants, glue and cement with gravel, sand and coarse aggregates.
8. The process for preparation of the brick as claimed in claim 5, wherein the proportion of the binder material is about 20-30% of the first part of the WEEE brick.
9. The process for preparation of the brick as claimed in claim 5, wherein the time required for the binder material to settle, expand, cure and harden partially is about 5-6 hours.
10. The process for preparation of the brick as claimed in claim 5, wherein the proportion of the WEEE material is about 70-80% of the first part of the WEEE brick.
11. The process for preparation of the brick as claimed in claim 5, wherein the coating material is selected from one or more of the following enamel paint, anti oxidizing primer paint.
12. The process for preparation of the brick as claimed in claim 5, wherein the brick is adapted to be corrugated with furrows or punch marks for enamel painting followed by rubber lamination.