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Sediment-recycling method

Abstract

A sediment-recycling method includes steps of collecting organic clay from sediment, sintering the clay into porous light-weighted material, breaking the porous light-weighted material into porous aggregate, blending the porous aggregate with modifier to provide a compound, turning the compound into pellets, melting the pellets to provide liquid, and molding the liquid into a final product. The weight of the porous aggregate is 80% of the weight of the compound and the weight of the modifier is 20% of the weight of the compound.

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Background/Summary

BACKGROUND OF INVENTION
1. Field of Invention
(1) The present invention relates to protection of the environment and, more particularly, to a sediment-recycling method useable for a water reservoir.
2. Related Prior Art
(2) A water reservoir is often built in a low-lying area in a mountain or a hill to collect water. A scale is often made on a wall or a damp to indicate volume of water in of such a water reservoir. However, actual volume of water is less than the indicated volume of water due to sediment at the bottom of the water reservoir. Hence, it is necessary to remove the sediment from such a water reservoir.
(3) After removed from such a water reservoir, the sediment is laid unstirred in another place adjacent to such a water reservoir for water to be vaporized from the sediment to reduce the water content in the sediment. Then, the sediment is moved to another place to be further processed. However, the sediment still contains a lot of water after it is left unstirred for some time, it is hence difficult to find a place that is large enough to contain the sediment or to further process the sediment.
(4) The sediment contains a relatively large amount of clay and relatively small amounts of sand,

silt and organic substances. The sediment can be processed to produce environmentally friendly building materials for. The processing is intended to increase ability for repulsion of water so that the sediment can be turned into light-weighted building materials that are good at repulsion of water. Such building materials can be waterproof cement or light-weighted aggregate for example.
(5) Taiwanese Patent Application Publication No. 201114509 discloses a method for making light-weighted aggregate. Quartz tiles are ground and sieved so that rough particles are separated from fine particles. The fine particles are mixed with sediment from a water reservoir. Then, the mixture is turned into a semi-product in a process including spray granulation and molding, a process including dehydration and extrusion, or a process including dehydration and granulation. Then, the semi-product is sintered at 1120 to 1180 degrees Celsius and turned into light-weighted aggregate. The sintering causes air in the semi-product to expand so that the aggregate is porous, light-weighted, sound-insulating and heat-insulating. However, the pores in the aggregate comprise water-proofness of the aggregate and strength of any thing made of the aggregate.
(6) A method for modification of clay is often used in modification of montmorillonite. Briefly, the montmorillonite is purified and processed with a modifying agent so that it becomes lipophilic to admit monomer into a silicon layer. Due to polymerization, nanometer-grate montmorillonite is mixed with polymer to provide a composite material with good mechanical and thermal properties. A grave problem with this method is that the purification costs a lot and hence renders the composite material expensive.
(7) Taiwanese Patent No. 1263624 discloses an inexpensive method for modifying sediment from a water reservoir in comparison with the purification of the montmorillonite. Cationic surfactant is used for exchange of cations so that a layer of silicon of the sediment is turned into hydrophobic from hydrophilic before the sediment is used to make a building material.
(8) Taiwanese Patent Application Publication No. 201210980 discloses an additive into sediment from a water reservoir. Then, the mixture of the sediment with the additive is made into a building material such as light-weighted aggregate, light-weighted bricks and foam plates in chemical manner without having to be dried and ground.
(9) Taiwanese Patent Application Publication No. 201210982 discloses an additive into sediment from a water reservoir to provide metallic ions and hydroxide after the sediment is dehydrated. Then, the mixture of the sediment with the additive is treated with heat to produce a building material such as light-weighted aggregate, light-weighted bricks and foam plates.
(10) The present invention is therefore intended to obviate or at least alleviate the problems encountered in the prior art.
SUMMARY OF INVENTION
(11) It is the primary objective of the present invention to provide an inexpensive and effective method for recycling sediment from a water reservoir.
(12) To achieve the foregoing objective, the sediment-recycling method includes steps of collecting organic clay from sediment, sintering the clay into porous light-weighted material, breaking the porous light-weighted material into porous aggregate, blending the porous aggregate with modifier to provide a compound, turning the compound into pellets, melting the pellets to provide liquid, and molding the liquid into a final product. The weight of the porous aggregate is 80% of the weight of the compound and the weight of the modifier is 20% of the weight of the compound.
(13) Other objectives, advantages and features of the present invention will be apparent from the following description referring to the attached drawings.

Description

BRIEF DESCRIPTION OF DRAWINGS
(1) The present invention will be described via detailed illustration of the preferred embodiment

referring to the drawings wherein:
(2) FIG. **1** is a flow chart of a sediment-recycling method according to the preferred embodiment of the present invention; and
(3) FIG. **2** is a perspective view of various phases of the sediment-recycling method used for a water reservoir.
DETAILED DESCRIPTION OF PREFERRED EMBODIMENT
(4) Referring to FIG. **1**, a sediment-recycling method includes steps **10** to **18** according to the preferred embodiment of the present invention. At step **10**, sediment is pumped from a water reservoir. At step **11**, the sediment is transported. At **12**, the sediment is classified. At step **13**, the sediment is dried. At step **14**, the sediment is crushed and ground. At step **15**, the sediment is modified. At step **16**, pellets are produced. At step **17**, the pellets are molded. At step **18**, a final product is produced.
(5) Referring to FIGS. **1** and **2**, at step **10**, a sand pump **23** is located on the surface of water **21** in a water reservoir **20**. The sand pump **23** is used to pump sediment from a bottom **22** of the water reservoir **20**.
(6) At step **11**, after pumped from the bottom **22** of the water reservoir **20**, the sediment **25** is sent to a vehicle **26** from the sand pump **23** through a pipe **24**.
(7) At step **12**, a vibrating-screen classifier **27** is used to classify the sediment **25** into debris **28**, gravel **29** and clay that contains organic substances. The clay will be used.
(8) At step **13**, the clay is dehydrated. Then, the clay is sintered at about 1200° C. to provide a light-weighted material **30**. The sintering causes the clay to expand and become the light-weighted material **30** in the form of a porous plate. The light-weighted material **30** can be circular or in any other shape.
(9) At step **14**, an eccentric grinder **31** is used to turn the light-weighted material **30** into porous aggregate **33**. The eccentric grinder **31** can however be replaced any other proper crusher or grinder.
(10) At step **15**, a blender **32** is used to blend the porous aggregate **33** with modifier **34** at high pressure in a physical manner. The mixture of the porous aggregate **33** with the modifier **34** is turned made into a compound **35**. The modifier **34** fill pores in the porous aggregate **33** to prevent the porous aggregate **33** from absorbing water.
(11) The porous aggregate **33** is blended with the modifier **34** at an advantageous ratio to produce the compound **35**. Preferably, the weight of the porous aggregate **33** is about 80% of the weight of the compound **35** and the weight of the modifier **34** is about 20% of the weight of the compound **35**.
(12) Preferably, regarding the weight, the modifier **34** includes natural adhesive that is about 5% of the compound **35** and plastic particles that are about 15% of the compound **35**. The weight of the modifier **34**, which is the sum of the weight of the natural adhesive and the weight of the plastic particles, is about 20% of the weight of the compound **35**.
(13) Preferably, the natural adhesive can be natural rubber, animal adhesive, vegetable adhesive, mineral adhesive, oceanic natural adhesive, protein adhesive, carbohydrate adhesive, natural resin adhesive, starch adhesive (such as starch oxide adhesive, esterified starch adhesive and high hydroscopic starch adhesive), cellulose adhesive (such as cellulose ether derivative and cellulose acetate derivative), tannic adhesive, lignin adhesive, gum Arabic adhesive or inorganic adhesive.
(14) Preferably, the plastic particles are made of thermoplastics or thermosetting plastics such as polypropylene (PP), polystyrene (PS), high-impact polystyrene (HIPS), acrylonitrile-butadiene-styrene (ABS), polyethylene terephthalate (PET), polyester (PES), polyamide (PA), polyvinylchloride (PVC), polyurethane (PU), polycarbonate (PC), polyvinylidene chloride (PVDC), polyethylene (PE), polymethylmethacrylate (PMMA), polytetrafluoroethylene (PTFE), polyetheretherketone (PEEK), polyetherimide (PEI), phenolic formaldehyde resin (PF), urea-formaldehyde resin (UF), melamine formaldehyde resin (MF) and poly lactic acid (PLA).

(15) At step **16**, the compound **35** is molten and turned into liquid. Then, the molten compound **35** is cooled and turned into a string **36**. Then, the string **36** is cut into pellets **37**. The porous aggregate **33** is blended with the modifier **34** before they are molten. Hence, the clay, the natural adhesive and the plastic particles are merged to render the properties of the string **36** and the pellets **37** different from the properties of the modifier **34**. In addition, the pellets **37** are not porous.
(16) At step **17**, the pellets **37** is fed to an injection molding machine in which the pellets **37** are molten and turned into liquid that is injected into a mold **38** by a plunger or threaded rod. The liquid is cooled in the mold **38** and turned into a solid final product.
(17) At step **18**, the mold **38** is opened and the final product is moved from the mold **38**. The final product **18** can be a stationary **39** such as a pen. Alternatively, the final product can be a container **40** such as a case. Alternatively, the final product can be a cap or plug **41**.
(18) As discussed above the steps **10** through **18**, the sediment is recycled and modified. Hence, the properties of compound **35** is quite different from the qualities of the modifier **34** or the properties of the sediment.
(19) The present invention has been described via the illustration of the preferred embodiment. Those skilled in the art can derive variations from the preferred embodiment without departing from the scope of the present invention. Therefore, the preferred embodiment shall not limit the scope of the present invention defined in the claims.

Claims

1. A sediment-recycling method comprising: collecting organic clay from sediment; sintering the clay into porous material; breaking the porous material into porous aggregate; providing a modifier with natural adhesive and plastic particles; blending the porous aggregate with the modifier to provide a compound, wherein the weight of the porous aggregate is 80% of the weight of the compound, wherein the weight of the natural adhesive is 5% of the weight of the compound, wherein the weight of the plastic particles is 15% of the weight of the compound; turning the compound into pellets; melting the pellets to provide liquid; and molding the liquid into a final product.
2. The sediment-recycling method according to claim 1, wherein the natural adhesive is selected from the group consisting of natural rubber, animal adhesive, vegetable adhesive, mineral adhesive, oceanic natural adhesive, protein adhesive, carbohydrate adhesive, natural resin adhesive, starch adhesive, starch oxide adhesive, esterified starch adhesive, hydroscopic resin adhesive, cellulose adhesive, cellulose ether derivative, cellulose acetate derivative, tannic adhesive, lignin adhesive, gum Arabic adhesive and inorganic adhesive.
3. The sediment-recycling method according to claim 1, wherein the plastic particles are made of at least one material selected from the group consisting of polypropylene (PP), polystyrene (PS), high-impact polystyrene (HIPS), acrylonitrile-butadiene-styrene (ABS), polyethylene terephthalate (PET), polyester (PES), polyamide (PA), polyvinylchloride (PVC), polyurethane (PU), polycarbonate (PC), polyvinylidene chloride (PVDC), polyethylene (PE), polymethylmethacrylate (PMMA), polytetrafluoroethylene (PTFE), polyetheretherketone (PEEK), polyetherimide (PEI), phenolic formaldehyde resin (PF), urea-formaldehyde resin (UF), melamine formaldehyde resin (MF) and poly lactic acid (PLA).