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(54) **METHOD FOR DESTRUCTION OF PROBLEMATIC WASTES.**

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Description

The present invention relates to a method for destruction of problematic wastes from the paint and lacquer industry, the plastics materials industry, the metal industry, the wood pulp industry, the shipping industry, petrochemical plants etc., i.e. wastes of the type discarded paints, paint sludge, greasy wastes, distillation residues etc., possibly containing oil sludge, organic compounds, etc.

The reason why such wastes are called "problematic wastes" is that great problems have till now been involved in handling of such wastes for disposal and/or destruction. One reason therefor is that the wastes are largely solid, viscous or sticky materials which are non-pumpable, the viscosity being above 100.000 cP and the solid matter content being close to 100%, usually about 80%.

Such materials have previously been incinerated in rotary furnaces of the same type as the cement kilns used for calcining cement. The material is fed to the upper end of the inclined rotary furnace, and at the same time oil is burned in order to increase the temperature and thereby enhance the combustion of the wastes. Such rotary furnace plants are extremely large and expensive. They operate with a large surplus of air and the efficiency is relatively low.

The object of the invention is to provide a method for destruction of such problematic wastes, which method may be carried out in substantially smaller and cheaper plants, and which can produce heat with greater efficiency.

This object is solved according to the invention by a method as defined in claim 1. Advantageous embodiments of this method are defined in claims 2 and 3.

It has now turned out that such wastes may be dispersed with water, whereby the wastes become pumpable and may be used as fuel in burners similar to oil burners. The water will primarily have a lubricating effect and thereby prevent clogging of pumps and pipes.

It is known i.e. from US—A—1926071 to add small amounts of water to heavy oil in order to obtain a better combustion of the oil. However, the amounts of water are far smaller than those according to the present invention and, furthermore, heavy oil is an already pumpable matter. Thus, the fact that a small addition of water to heavy oil improves the combustion of the oil, does not make it near at hand to disperse essentially solid problematic wastes of the type referred to above in water in order to produce a pumpable dispersion.

More specifically, the invention consists in that the waste by mechanical mixing and, if required, by tearing and/or comminuting are dispersed in water to saturation, preferably to a water content of 20 to 40%, whereby a pumpable dispersion is obtained, which may be used as a fuel.

From GB—A—1 337 116 it is known to burn pumpable mixtures containing at least 50% oil and possibly other hydrocarbons. The mixture is pumped to the burner by means of a pump which homogenizes the various liquids and any comminuted solid matter of which the mixture consists. The basis of the method disclosed in the patent specification is accordingly pumpable matter and not viscous, stiff problematic wastes of the type with which the present invention is concerned.

From US—A—3 762 887 it is known to mix particulate coal and water to form a slurry that can be pumped and burned. Coal dust is a material radically different from the wastes with which the present invention is concerned.

The problematic wastes may for instance be received in large barrels which are emptied into a trough having a paddle screw for coarsely breaking lumps and viscous mass with addition of water through nozzles for lubrication and reduction of the rate of evaporation of solvents, whereupon the coarsely broken mass is treated in a high speed mixer with addition of further water for comminuting lumps and preparing a homogeneous solution and dispersion in the water. In this way it is possible to obtain a mixture having a solid matter content of about 50% and a viscosity of below 1500 cP. When the mixture has become homogeneous, the pumpable dispersion obtained in the high speed mixture is drawn by vacuum into a combined pressure/vacuum tank, and a new charge is fed to the high speed mixer for comminuting and dispersing. The pumpable dispersion in the pressure/vacuum tank is forced through a self-cleaning filter to a storage tank in which continuous agitation is preferably effected. Even without continuous agitation the ingredients in the mixture will separate only to a small degree, and the dispersion may therefore at any time be re-established by a comparatively small mixing effort.

Below the invention will be further described, reference being made to the drawing, which illustrates an apparatus in which the method may be performed.

The single Figure is a side view, partly in section, through parts of an apparatus for carrying out the method according to the invention.

In the Figure there is shown a trough 1 having a double paddle screw 2 driven by a motor 3.

Wastes to be treated are emptied into the trough 1.

The wastes may be supplied in barrels which after opening are lifted onto a support adjacent to the trough. The support may be somewhat tilted in order to make the contents settle slowly from the barrels. Such settling will usually take place if recourse is had to time, since even viscous wastes are usually emptied in about one hour's time. If the wastes are extremely hard, hand tools may be used to accelerate the emptying operation.

The wastes may comprise sticky binders and pigments obtained as a distillation residue from paints, and wastes containing gelled two-component binders.

Very solid wastes may be involved, even after a gelled top slab or "cake" has been removed.

A grating may be provided on the top of the trough. It may be necessary to remove this grating if the wastes are especially hard.

In the trough 1 lumps and viscous mass are coarsely broken in water added through nozzles. In this connection the water serves for lubrication, and at the same time it reduces the rate of evaporation of any organic solvents.

At the end of the trough 1 there is provided a sluice gate 4 which may be raised in order to allow greater or smaller portions of the contents of the trough to flow into a high speed mixer 5 consisting of a container equipped with an agitating device 6 mounted on a vertical shaft 7. In the mixer further water may be added, and the agitating device will comminute solid lumps and dissolve and disperse them in the water. In this manner a substantially homogeneous mixture may be obtained, said mixture having a solid matter content of about 50% and a viscosity of below 1500 cP. Such a mixture or dispersion is pumpable and is pumped into a combined pressure/vacuum tank 8. The pumpable dispersion in the pressure/vacuum tank is forced through a self-cleaning filter (not shown) and further to a storage tank. In the filter, metal chips and stones which may cause difficulties in burner nozzles, are separated. Only insignificant amounts of the mixture in the order of a few ppm are retained by the filter.

From the storage tank the dispersion may be pumped direct to special atomizing nozzles in a combustion chamber in order to utilize the heat energy in the wastes. Alternatively, the dispersion may be transported in tank lorries to combustion plants in for instance manufacturing companies which may use the heat energy produced. This energy will of course be somewhat reduced because of the addition of water, but this reduction is more than balanced by the fact that a consistency of the wastes has been obtained which allows pumping and combustion in waste burners.

Operation in a pilot plant has shown that solid, viscous and sticky materials such as discarded paints, paint sludge, distillation residues etc. may be comminuted and made pumpable. It has further proved that clogging of pumps and tubes does not occur, presumably because the relatively high water content provides a lubrication by mechanical surface contact. The control of the combustion is simple due to the fact that the wastes are transformed into a pumpable form, which may be atomized in fuel nozzles. Further, the same advantage is obtained as when water is emulgated into heavy oil, viz. that the emulgated water drops will be exposed during the combustion to a violent expansion which "blasts" the wate particles and thereby provides a further comminution or atomization of the wastes.

It has also proved that the flue gases are relatively easy to clean, which is probably due to the fact that the atomizing obtained produces an agglomeration of non-combustible particles after the combustion zone, so that the size of the solid particles in the flue gases is increased. If the flue gases should be acid, they may easily be neutralized by the addition of for instance caustic soda, NaOH, to the mixture.

Because of the atomization obtained by means of the addition of water, the surplus of air may be reduced to approximately stoichiometric ratios. More specifically the air surplus may be about 15%, meaning that the ratio between the actual and stoichiometric amounts of air is about 1.15 as opposed to about 2 in a fluidized bed combustion and 3—4 in a combustion in a rotary furnace. The small surplus of air in connection with the high water content will reduce possible formation of free chlorine. Any chlorine molecules will agglomerate with the flue particles and may be caught in bag filters.

The original wastes may contain solvents of class A and B. These solvents are usually present as a relatively small part of the mixture, but still warrant a classification as A or B liquid. In this connection the additional water will inhibit the evaporation of solvents because of the vapour partial pressure of the water and increase the flashing point of solvents which are miscible with water.

The risk of reaction between the various compounds in the mixture has proved to be small. This may be due to the fact that water is a good heat conductor and that water reduces the contact between the compounds.

The operation in the pilot plant has also proved that very little corrosion occurs in tubes and other equipment. The addition of water provides no problems, presumably because of the oil and fat emulsions produced.

Claims

1. A method of disposing of non-pumpable solid or viscous problematic wastes such as discarded paints, paint sludge, greasy wastes, distillation residues etc., possibly containing oil sludge, organic compounds etc., characterized in that the wastes are mechanically reduced in size and that they are simultaneously or successively dispersed in water to saturation by mechanical mixing, whereby a pumpable dispersion is obtained which may be used as a fuel.

2. A method according to claim 1, characterized in that the wastes are first coarsely broken in a trough having a paddle screw with addition of water through nozzles for lubrication and reduction of the rate of evaporation of solvents, whereupon the coarsely broken mass is treated in a high speed mixer with addition of further water for comminuting lumps and preparing the homogeneous dispersion in the water.

3. A method according to claim 1 or 2, characterized in that the pumpable dispersion is passed through a filter to a storage tank in which continuous agitation is preferably effected.

Patentansprüche

1. Verfahren zum Beseitigen von nicht pumpbaren festen oder viskosen Problemabfällen wie Abfallfarben, Farbschlamm, Ölabfälle, Destillationsrückstände usw., welche möglicherweise Ölschlamm, organische Verbindungen usw. enthalten, dadurch gekennzeichnet, daß die Abfälle mechanische in ihrer Größe reduziert werden und daß sie gleichzeitig oder aufeinanderfolgend in Wasser durch mechanisches Mischen bis zur Sättigung dispergiert werden, wobei eine pumpbare Dispersion entsteht, welche als Brennstoff benutzt werden kann.

2. Verfahren nach Anspruch 1 dadurch gekennzeichnet, daß die Abfälle zunächst grob in einem Trog mit einer Schaufelschraube zerkleinert werden unter Zusatz von Wasser durch Düsen zum Schmieren und Verringern der Verdampfungsrate der Lösungsmittel, wonach die grob zerkleinerte Masse in einem Hochgeschwindigkeitsmischer behandelt wird unter Zusatz von weiterem Wasser zum Pulverisieren von Klumpen und Herstellen der homogenen Dispersion in dem Wasser.

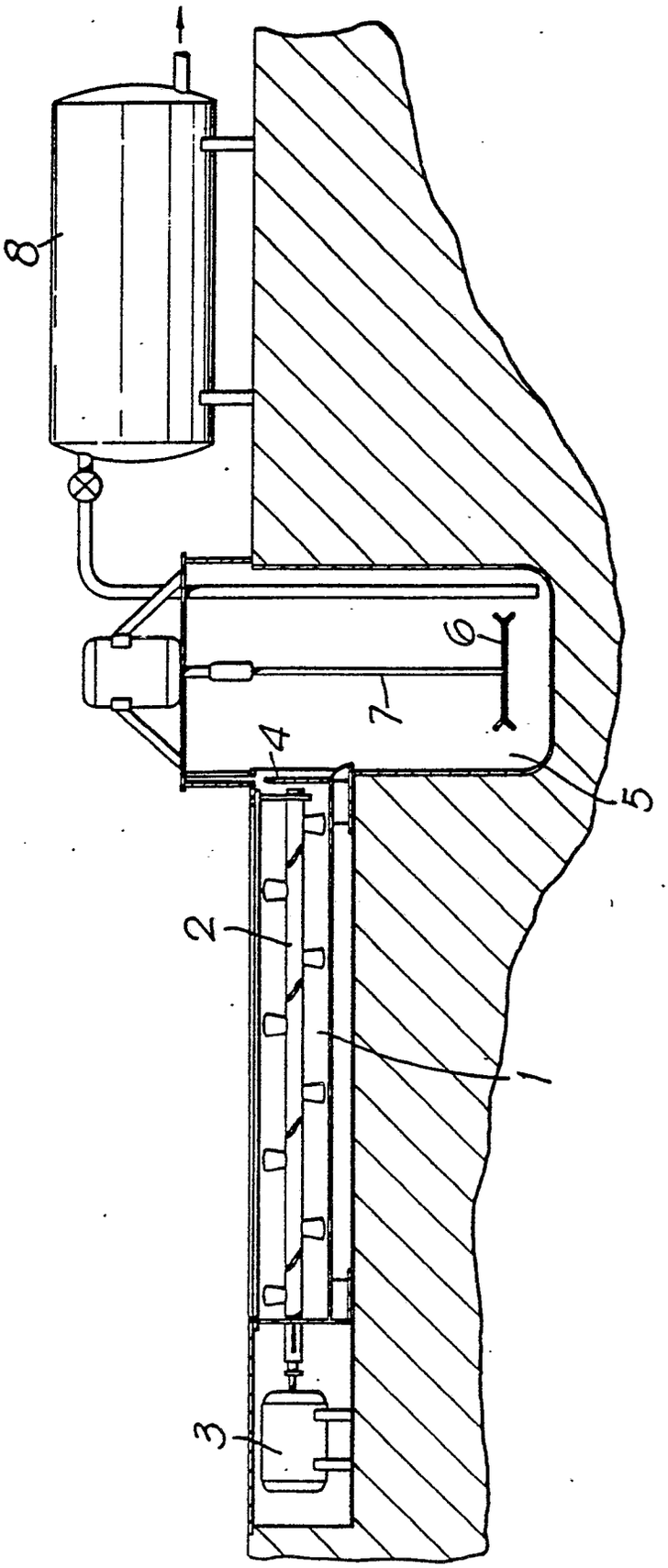
3. Verfahren nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die pumpbare Dispersion über einen Filter zu einem Speichertank geführt wird, in welchem vorzugsweise ein kontinuierliches Rühren bewirkt wird.

Revendications

1. Procéde de destruction de déchets embarrassants solides ou visqueux non pompables tels que des peintures de rebut, des dépôts de peintures, des déchets graisseux, des résidus de destillation etc., eventuellement contenant de la crasse d'huile, des composés organiques etc., caractérisé en ce que l'encombrement des déchets est reduit mécaniquement et qu'ils sont simultanément ou successivement dispersés dans l'eau jusqu'à la saturation par mélange mécanique de sorte qu'on obtient une dispersion pompable pouvant être utilisée comme combustible.

2. Procédé selon la revendication 1, caractérisé en ce que les déchets sont d'abord soumis à un prébroyage dans une cuve muni d'une vis à ailettes en ajoutant de l'eau à travers des buses pour la lubrification et la diminution du taux d'évaporation des solvants et ensuite la masse prébroyée est traitée dans un mélangeur à haute vitesse avec addition supplémentaire d'eau pour le broyage des amas et l'obtention de la dispersion homogène dans l'eau.

3. Procédé selon la revendication 1 ou 2, caractérisé en ce que la dispersion pompable est passée à travers un filtre vers un réservoir de stockage dans lequel une agitation continue est de préférence prévue.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