(12) UK Patent Application (19) GB (11) 2 035 113 A

(21) Application No **7924145**
(22) Date of filing
11 Jul 1979
(30) Priority data
(31) **2831384**
(32) **17 Jul 1978**
(33) **Fed Rep of Germany (DE)**
(43) Application published
18 Jun 1980
(51) **INT CL³ B01D 37/02**
(52) Domestic classification
B1D 1404 1406 1505 GG NB
(56) Documents cited
GB 552137
GB 219194
(58) Field of search
B1D
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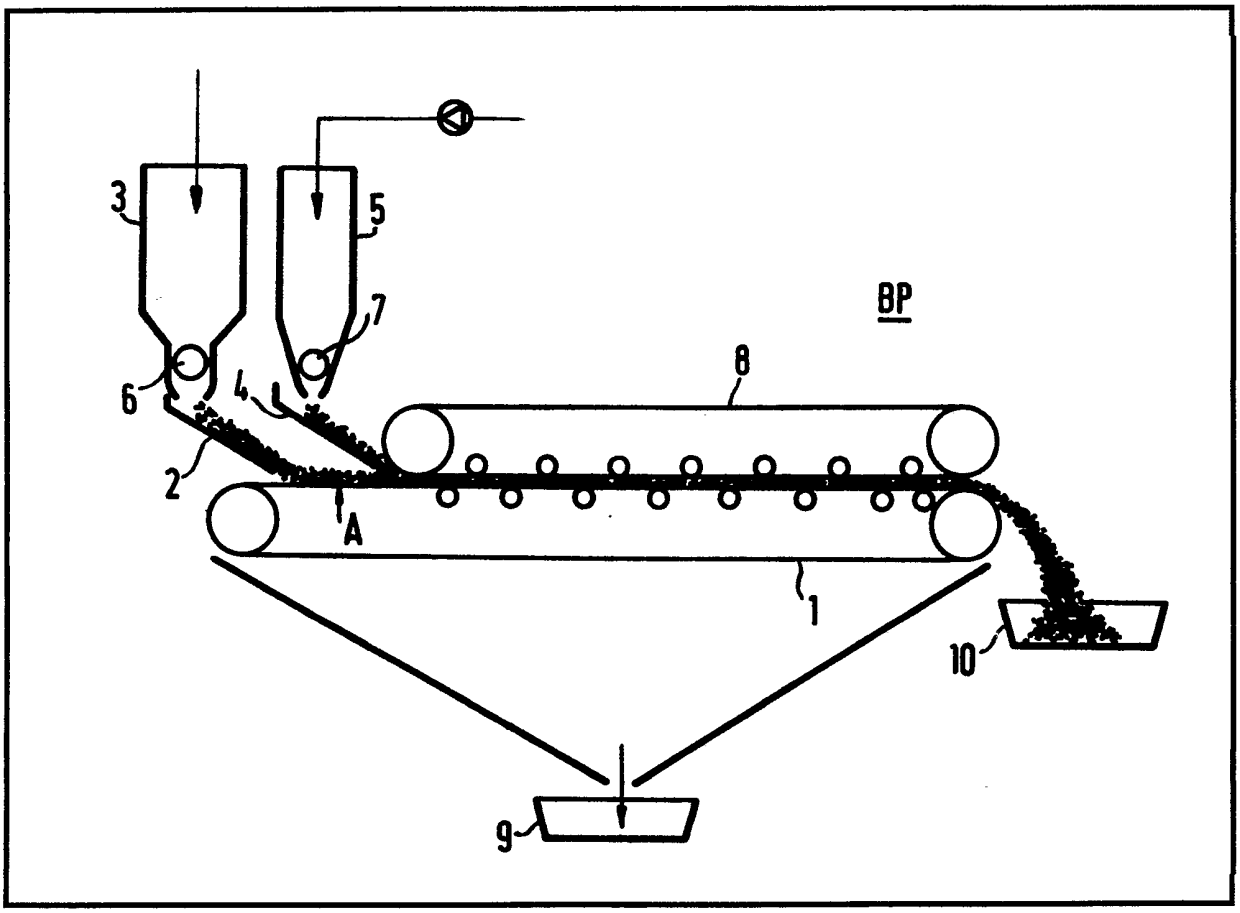
(54) Filtering aid

(57) A layer 2 to 10 cm thick of a filtering aid, such as compost, or peat, is passed from a container 3 down a vibrating chute 2 to the free part A of a screen belt 1 of a screen belt press. This applied layer is then impregnated with the suspension or sludge to be treated in a quantity 5–10 times greater than the filtering aid, the sludge being passed from a container 5 down a chute 4 onto the applied layer. The filtering aid comprises porous organic particles larger than the sludge particles which are absorbed by the filtering aid particles. The mixture is then pressure-filtered between belts 1 and 8 of the screen belt press, the filtrate is passed to a container 9, and the filter cake is transferred to a container 10.

A preferred filtering aid layer comprises an extensively degraded but biologically still active compost which has a fibrous structure and high water absorptivity. The water content of this compost is approximately 30 to 50% by weight.



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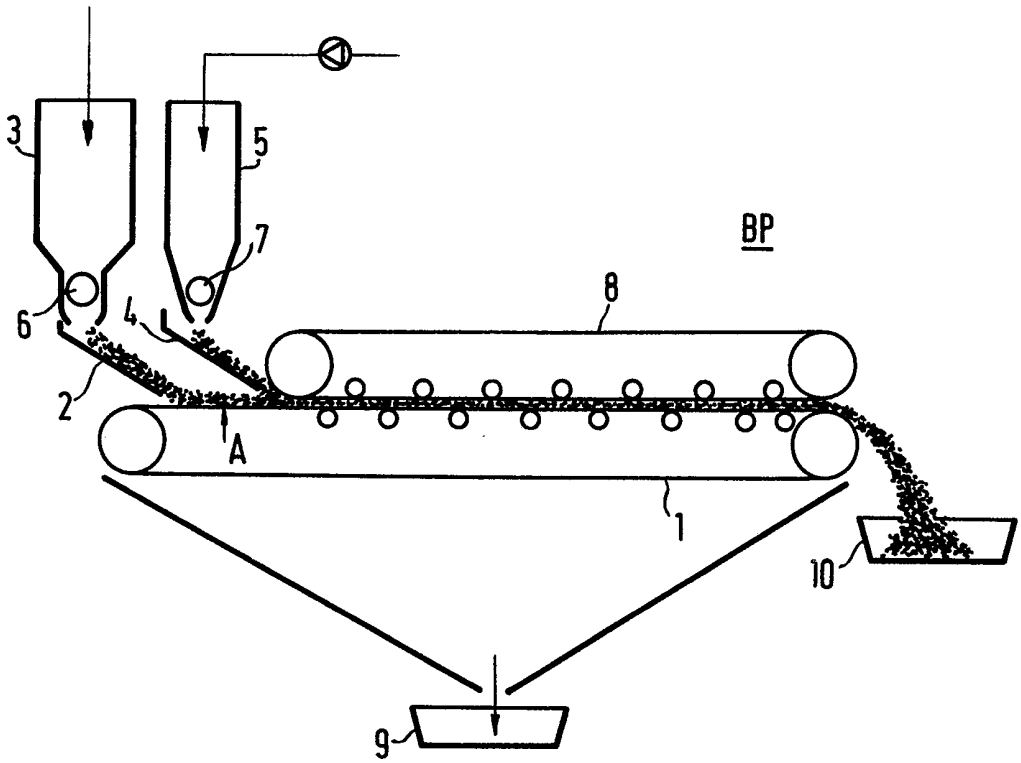
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SPECIFICATION

A filtering aid

TECHNICAL FIELD

The present invention relates to a filtering aid for the treatment of suspensions, and particularly of domestic, industrial and other sludges for subsequent drainage.

BACKGROUND ART

The draining of sludges, particularly sewage sludge can only be carried out by using so-called filtering aids because of the small particle sizes of the sludge particles, the surface tension of the sludge liquor, the viscosity, the high compressibility and other properties which lead to a high specific filter resistance of the sludges. Known filtering aids are iron and aluminium salts in conjunction with calcium hydroxide, as well as of late high molecular weight, water-soluble polymers of a cationic type. As a result of the metered addition of such filtering aids and their mixing with the sludge prior to its drainage due to the exchange of electrical charges on suspended sludge particles and particle surfaces are destabilized and are able to coagulate and flocculate, of U. Moller, "Zur Tecnhologie der Schlammentwasserung", Stadtehygiene 3/1967, pp 54 to 59.

The structure of the flakes formed through the use of polymers are much looser than those resulting from a conventional coagulation, so that the final water content of the mechanically drained sludge is lower. However, they are very sensitive to mechanical stressing, so that all the known draining processes cannot be used. It has also been found that a prolonged ventilation of the sludge also has an unfavourable action on the flakes and leads to the destruction of the latter. Since, in particular domestic sludge is obtained every day in large quantities such filtering aids increase the operating costs of sewage treatment plants. Finally chemical additives are disadvantageous from the biological standpoint, particularly if the sewage sludge obtained is to be returned to the biological circuit as compost.

It is an aim of the invention to alleviate the aformentioned disadvantages, and according to one aspect of the invention there is provided a filtering aid for the treatment of sludges and suspensions, comprising a mixture of porous organic substances of high liquid absorptivity having particles which are considerably larger than the sludge particles and which absorbs the said sludge particles and ballast liquid.

In a preferred embodiment of the invention the filtering aid is an extensively degraded, but biologically still active compost having a fibrous structure and high water absorptivity, whose water content is approximately 30 to 50% by weight.

According to another aspect of the invention there is provided a method of draining sludges and suspensions by means of overpressure filtration and the use of the aforementioned filtering aid; said method comprising loosely applying a layer of filtering aid approximately 2 to 10 cm thick to the screen belt of a screen belt press, impregnating this layer with the suspension to be drained by spraying with 5 to 10 times the quantity of the applied layer, and then pressure draining this layer.

A further layer of filtering aid approximately 1 to 5 cm thick may be uniformly applied to the layer which is impregnated with the suspension.

One embodiment of the invention will now be described by way of example with reference to the accompanying illustrative drawing which is a diagrammatic side elevation of a screen belt press.

DETAILED DESCRIPTION OF THE DRAWING

Referring to the drawing, a 2 to 10 cm thick filtering aid layer in the form of compost or peat is applied to the free part A of the screen belt 1 of the screen belt press BP of conventional construction by means of a vibrating chute 2 which extends loosely over the screen belt width. The filtering aid is taken from a container 3. The applied layer is subsequently impregnated with the suspension to be treated, in the present case a domestic sewage sludge and specifically with approximately 5 to 10 times the quantity of compost applied. The impregnation limit is imposed by the liquid mixture containing about 93 to 96% by weight of water not running off the screen belt. Impregnation also takes place by means of a chute 4 extending over the width of the screen belt and which is supplied from a container 5. With both containers is associated a metering device 6, 7, not shown in detail, in order to be able to determine the quantities of filtering aid and suspension to be delivered. On application of the suspension the filtering aid fills itself in the manner of a sponge. The sludge particles carried along are transferred into its capillaries and are retained there. Thus, no longer does the sludge dispersion rest directly on the screen belt. The mixture applied in this way is conveyed below pressure belt 8 by means of screen belt 1 and in per se known manner is pressure-filtered. The filtrate passes into a container 9, whilst the filter cake is transferred into a container 10. Mechanical drainage therefore takes place in per se known manner, the filtering action of the screen belt being significantly increased by the filtering aid.

If the nature of the sludge to be drained would appear to make this necessary a further approximately 1 to 5 cm thick layer of filtering aid can be applied in the described man-

ner to the suspension-impregnated layer, the filtering aid preferably being compost or a commercial peat, whose moisture content is as low as possible. The metering devices are for example metering or proportioning screws.

Example I

Domestic sewage sludge is mixed with 10 to 15% of a natural carbon carrier, is rotted in a closed aeration tank such as is e.g. described in DOS 25 41 070 and, after being discharged therefrom undergoes subsequent rotting lasting one to two weeks at temperatures of approximately 30 to 40°C. The biologically active compost obtained in this way, i.e. having a high content of microorganisms, actinonycetes, bacteria and the like is to be immediately used as a filtering aid, without prolonged intermediate storage.

Example II

Commercial peat is to be mechanically comminuted and conditioned to a particle size equal to or smaller than 10 cm. Its water content should not exceed approximately 40% by weight. The peat treated in this way is to be immediately used as a filtering aid.

The use of compost or peat as a biologically and/or physically acting filtering aid has a number of advantages. The size of the sludge particles is considerably increased by the compost or peat placed on the screen belt in the case of a metered addition of the sludge, because in the case of liquid absorption by the compost or peat these particles are also transferred into the capillaries. Thus, as in the case of deep filtration the particles which are smaller than the pore size of the compost or peat particles penetrate their capillaries and are deposited there. The sludge viscosity is considerably reduced by the fibrous structure of the compost or peat. As the introduction of sewage sludge into a compost layer also immediately brings about biologically exothermic reaction products the sludge temperature is increased, which leads to a reduction of the surface tension of the sludge liquor. Compost and peat remain stable during the mechanical drainage process. Thus, there is no dissolving back of the sludge particles during the subsequent mechanical drainage or ventilation as occurs with chemical flocculating agents. Even industrial sludge which is difficult to flocculate or does not flocculate can be drained in accordance with the procedure of the described example. The addition of compost or peat is not chemically disadvantageous either to the decaying process for converting e.g. sewage sludge into compost or to the ballast water separated from the sludge. In addition, the carbon percentage in the filter cake is increased, which has a positive action on the carbon/nitrogen ratio during a subsequent biological utilisation, e.g. for decaying or rotting purposes. This leads to the further advantage that in the case of the controlled rotting of the filter cake obtained by using peat as the filtering aid there is no need to add carbon carriers, whilst when using compost as the filtering aid there is no return of rotting product for the purpose of inoculating and improving the structure of the drained sludge. The addition of such additives which permit the rotting process to take place has already occurred in the "drainage" stage. Thus, during the subsequent stage of sludge removal it is only necessary to add filter cake and carbon carriers to the rotting process, which also has an advantageous influence on the mixing process which always precedes the rotting process.

When compost is used as the filtering aid both the filter cake and the outflowing filtrate is inoculated with microorganisms. The microorganisms transferred into the filter cake by the compost initiate a spontaneous biological degradation process, i.e. start the rotting or decay process. As in this stage sufficient atmospheric oxygen is present this degradation process is of an aerobic nature, so that there is no unpleasant smell. Thus, the compost applied to a large extent absorbs the unpleasantry smelling gases given off by the sludge. This is particularly advantageous when the drained sludge is intermediately stored or transported. The microorganisms which enter the filtrate with the compost, i.e. the power or ballast water are generally returned to the biological treatment process and have once again a biological inoculation action, which favourably influences this process. The proportion of colloidal particles in the filtrate is considerably reduced by the filtration improved by the filtering aid.

In addition, such filtering aids can be produced from the sludge obtained at the place where the sewage treatment plant is located and need not therefore be acquired from third parties. In addition, the mixing equipment, metering pumps and stirrers required with chemical filtering aids are rendered superfluous. Finally when using the filtering aid of the described example the prevention of unpleasant odours at the drainage point has a favourable influence on the operating staff.

The described example envisages a novel inexpensive filtering aid for the drainage of suspensions, particularly sludge, which essentially comprises substances acting in a biological and physical manner which at least continously increases for the subsequent filtration the particle size and density of the particles dissolved in the suspension, whilst reducing the viscosity of the suspension, together with a novel method for the draining of suspensions, particularly of sludge using such filtering aids.

CLAIMS

1. Filtering aid for the treatment of

sludges and suspensions, comprising a mixture of porous organic substances of high liquid absorptivity, having particles which are considerably larger than the sludge particles and which absorbs the said sludge particles and ballast liquid.

2. A filtering aid according to Claim 1, comprising an extensively degraded, but biologically still active compost having a fibrous structure and high water absorptivity, whose water content is approximately 30 to 50% by weight.

3. A filtering aid according to Claim 1, comprising a commercial peat with a water content of approximately 40% by weight, which is mechanically given a uniform structure with an average particle size of approximately $\leqslant$ 10cm.

4. A method of draining sludges and suspensions, by means of overpressure filtration and the use of filtering aids according to Claims 1 to 3, comprising loosely applying an approximately 2 to 10 cm thick layer of filtering aid to the screen belt of a screen belt press, impregnating this layer with the suspension to be drained by spraying with 5 to 10 times the quantity of the applied layer, and then pressure-draining this layer.

5. A method according to Claim 4, comprising uniformly applying a further approximately 1 to 5 cm thick layer of filtering aid to the layer impregnated with the suspension.

6. A filtering aid for the treatment of sludges and suspensions substantially as herein described and shown in the accompanying drawings.

7. A method of draining sludges and suspensions substantially as herein described with reference to the accompanying drawings.

Printed for Her Majesty's Stationery Office
by Burgess & Son (Abingdon) Ltd.—1980.
Published at The Patent Office, 25 Southampton Buildings,
London, WC2A 1AY, from which copies may be obtained.