

ALIEN PROPERTY CUSTODIAN

PROCESS FOR DRESSING COALS BY EMPLOYING AN AQUEOUS HEAVY SUSPENSION PRODUCED FROM SILT

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This invention relates to a process for dressing coals or the like by means of specific gravity separation, characterized by employing as a medium an aqueous heavy suspension produced from water and silt of the grain size 0.05-0.005 mm. or a material consisting largely of the silt.

There are various kinds of heavy solutions known for dressing or separating coals for laboratory use, which however are defective in being hard to obtain cheaply and claiming a big cost for recovering the solution attached on the surface of the coal to be treated. Thus it is an important object of study for experts how to prepare a cheap heavy liquid, in other words, how to reduce the cost of the heavy liquid employed for coal dressing. Of the known processes of this kind for dressing coals, the so-called Lessing's method is the only one that employs a heavy solution. It uses a saturated aqueous solution of calcium chloride and therefore has the drawback of requiring a big cost for the solution employed and accordingly is unfit for general use. There is also a method known as De Vooy's method which employs a heavy suspension prepared by dispersing clay and barite powders in water. It requires a smaller cost for the solution employed than Lessing's process and is considered only as being superior to the latter. Moreover, such suspension prepared by dispersing clay in water has the disadvantage of having high viscosity, although it is stable. It therefore is unsuitable as a medium for dressing coals. The clay is found anywhere in the world, so that but for the above disadvantage there would have been adopted a process for dressing or separating coals by employing as a medium an aqueous suspension prepared from the clay and water. As it is, such process has not been realized anywhere on account of the above fatal defect. This clay is only used together with other heavy solid materials as one of the materials for a heavy suspension.

After several year's hard study and various experiments conducted on the property of fine soils and the like to remove such defect of the clay and to investigate the most economical liquid as a medium, the inventor has succeeded in finding a heavy liquid to meet the requirement of heavy liquid coal separation by preparing an aqueous heavy suspension from water and silt or a material consisting largely of the silt collected from fine soils, sludgy tailings at ore dressing works or pulverized sand powder or obtained from silt deposit.

The present invention relates to a process for

dressing coals or the like by means of specific gravity separation, characterized by employing as a medium an aqueous heavy suspension of the specific gravity of about 1.35-1.70 which suspension is produced from water and silt or a material consisting largely of silt collected from fine soils, the said sludgy tailings or pulverized sand powder or obtained from silt deposit and by dispersing this silt or the like in water in suitable proportion, about 0.7% of solid material : 1 of water to about 1.8 : 1 of same. The thus prepared aqueous heavy suspension has so low viscosity and stable density that it cannot only effect the desired coal dressing or separation with high efficiency, but also is more economical than in the above known processes.

Fine soils or the like under 2 m.m. according to the mechanical analysis for determining their grain sizes may be roughly classified into three kinds, viz. sand (2-0.05 mm.), silt (0.05-0.005 mm.) and clay (0.05-0 mm.) and the above sand may be subdivided into five kinds, namely, very coarse sand (2-1 mm.), coarse sand (0-0.5 mm.), medium sand (0.5-0.25 mm.), fine sand (0.25-0.1 mm.) and very fine sand (0.1-0.05 mm.), and then the above clay into two kinds, viz. clay (0.005-0.001 mm.) and colloid (0.001-0 mm.). If the samples classified by the above sub-division are dispersed in water, those having bigger grain size than the very fine sand all sink quickly in water and do not form stable suspensions. The suspension prepared from the clay has high viscosity, and the one produced from colloid has much higher viscosity. Thus, neither of them is fit for dressing coals. According to this invention, it has been found that the aqueous heavy suspension produced from water and silt or material consisting largely of silt has stability and low viscosity so that it is very suitable as a medium for dressing coals or the like. In experiments, the density of the aqueous heavy suspension according to this invention can be maintained uniformly without any special mechanical agitator during dressing or separating operation, and the low viscosity indicates the viscosity of such degree as is fit for coal dressing or separation, namely, the viscosity shown by a saturated aqueous solution of calcium chloride. The above silt may be collected in such way that coarse one is removed with sieve, while fine one is obtained by dispersing it in water in a very dilute state and thus utilizing the difference of the sinking velocity due to the difference of the grain size.

This invention has the advantage of being able

to dress coals or the like more economically than the methods which employ the known heavy suspension.

The following is the limit allowed to sand, clay and colloid to be contained in the above silt employed in this invention. It is advisable that the sands should be contained in silt as little as possible to maintain the density of the liquid in a stable condition. Especially, a coarser one than medium sand must not be contained in it. Moreover, in order that the viscosity of the liquid may not be high, the limit allowed to the quantity of clay and colloid to be contained in silt is narrowed with the increase of the desired specific gravity of the liquid. Above all, the removal of the colloid which is most powerful for increasing the viscosity is essential. For example, when the desired specific gravity of the aqueous suspension to be produced from water and the silt of specific gravity of about 2.65 is about 1.4, this silt is allowed to contain less than about 20% of clay and less than about 3.0% of colloid, whereas when it is about 1.6, more than 5% of clay and more than 0.5% of colloid must not be contained in it.

If the aqueous heavy suspension produced from water and the above silt is kept still in a separating tank, it will produce a relatively clear upper portion, which gradually increases its quantity, but when the coal or the like to be treated is thrown into it and the separation is started, the suspension has its density restored to the original condition quickly by the floating and sinking phenomena of the material to be treated and the operation of removing it, so that it maintains uniform density, thus making it almost unnecessary to stir it to stabilize its density. To easily separate the liquid attached on the

surface of the material treated with a small quantity of water after the separation, the material to be treated had better have its surface wetted sufficiently with water before it is thrown into a separating tank. Also, when the desired specific gravity of the suspension is high, it is preferable to raise the temperature of the suspension as the means of lowering its viscosity.

For the said fine soil or the like from which the above silt is produced, it is preferable to have high specific gravity containing a larger quantity of silt and smaller quantities of sand, clay and colloid. Especially the one containing the smallest quantity of colloid should be chosen. The specific gravity of the above silt is about 2.4 to 3.0, although it varies according to the kind of the constituent, but is generally about 2.6 to 2.8.

The following is an example of the quantities of the above silt and water needed for preparing one litre of the aqueous heavy suspension used in this invention:

If the desired specific gravity of the suspension is 1.45 when the said silt of the specific gravity 2.65 is employed, the quantities of the silt and water may be 725 gr. and 725 c.c., while if it is 1.5, they may be 815 gr. and 692 c.c.

Thus, the present invention is a process for dressing coals or the like by means of a specific gravity separation, characterised by employing as a medium an aqueous heavy suspension which is prepared by dispersing in water the cheap and easily accessible silt and which can display the same as or higher dressing efficiency than the process employing the known heavy suspension. Therefore, this process is very effective to realize economical coal dressing.

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