

# ALIEN PROPERTY CUSTODIAN

## PROCESS FOR DRESSING COALS OR SIMILAR SUBSTANCES

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It is well known to experts that if in the coal dressing, namely, the classification and separation of coals, it is possible to employ as a medium a solution of low viscosity having a desired specific gravity, the dressing may be performed with the highest efficiency. However, the heavy solutions fit for the coal-dressing are all so expensive as to be unsuitable for practical purposes. Therefore, none of them is used widely yet.

Now, according to the present invention it has been found that a heavy suspension of low viscosity and almost stable density can be produced by the dispersion in water of clay and finely-ground powder of pyrite (or iron sulphide) cinder or brittle iron ore of small utility value. This invention based on such new insight has succeeded in dressing coals and similar substances very economically with high efficiency by putting the material to be dressed, namely, coals or similar substances into a medium consisting of the heavy suspension of low viscosity and almost stable density which is produced by dispersion in water of clay and fine powder of pyrite-cinder brittle iron ore and causing floating and sinking phenomena and thus effecting the classification and separation by the difference of the specific gravities. The object of the present invention is to carry out the dressing of coals or similar substances economically with high efficiency by employing an inexpensive heavy suspension of low viscosity and almost stable density instead of an expensive heavy solution.

The clay used in the present invention must essentially have the composition particles less 0.06 mm. in diameter (undersized through a 200 meshes screen), the coarser ones being undesirable. In this invention, the powder of pyrite cinder indicates the residual iron oxide to be easily powdered which is produced after pyrite (or iron sulphide) ore is provided for the manufacture of sulphuric acid; and the iron ore, porous brittle cinder of siderite ore or brittle iron ore such as earthy or granular limonite. Although these substances possess the specific gravity of about 4, they are regarded as of little or no use for other purposes. The particles of these substances should be finer than 0.06 mm. in diameter and the coarser ones which remain after sizing and selecting are finely ground for use.

A suspension of mere clay and water is generally so highly viscous that it seems impossible to produce a suspension of the specific gravity of more than 1.35 and of the viscosity fit for dressing. But the suspension, in which clay and the

above-mentioned powder of heavy substances are dispersed, has so low viscosity and almost stable density that it is possible to produce a heavy liquid having the specific gravity 1.35 to about 1.7 suitable for coal-dressing.

It is desirable that the viscosity of a suspension should be reduced with the diminishing of the size of the material to be dressed, although in handling of the material to be dressed which is more than 6 mm. in diameter the suspension may be prepared on the standard of the viscosity shown by calcium chloride solution of the specific gravity 1.4 at 20° C or the ordinary room temperature. When the materials to be dressed are finer than 6 mm. in diameter, a suspension of the lower viscosity is employed. Since a suspension showing a desired specific gravity and viscosity must have the proportion of the materials vary considerably according to their property, a suitable proportion must be selected economically after examining the property of the materials.

As an example, let me explain the case where there are used powder of pyrite-cinder of the specific gravity 4.7 and clay of the specific gravity 2.6, both undersized through a 200 meshes screen. In this case, the above-mentioned suspension of the standard viscosity has such proportion of the materials per litre that, when its specific gravity (density) is 1.4, water, clay and powder of pyrite-cinder are 806 c.c. 387 grms. and 207 grms. respectively, while when it is 1.5, they are 790 c.c., 344 grams and 366 grams respectively. Further, when it is 1.6, they may be 776 c.c., 288 grams and 538 grams. If such suspensions are kept still in a vessel, they will have a clear liquid at the upper portion in a short time which gradually increases its quantity, while they receive but very little change in the suspension part, so far as the density is concerned. That is to say, if the said suspensions are filled to the depth of 16 centimeters in a glass tube of 20 centimeters high and after they are kept still for two hours, some of them are taken out as samples at the parts near the upper and lower ends and when their difference in the specific gravity is measured, it is found that the one having the specific gravity 1.6 is  $\frac{3}{1000}$ , and the others also less than  $\frac{19}{1000}$ .

The liquid attached on the surface of the materials to be dressed are washed off with water or rinsing water after the dressing, and after it is reclaimed in a settling tank or thickener, its upper clear portion is removed so that it may have

its density raised to as high as the original one and be used repeatedly for coal-dressing.

Since the suspension employed in the present process is stable as stated above, it is possible to prevent the change of its density by throwing in the materials to be dressed, floating and sinking phenomena and the operation of eliminating floating substances and sinking ones during the coal dressing. Moreover, a supply of liquid and reclaimed one are both poured from the tank into the suspension in a dressing tank through many holes at its side by a pump, thus not only uniforming the density of the liquid, but also making the classifying and separating action effective. The liquid in the dressing tank during the suspension of a dressing operation is, if necessary, circulated or stirred with the pump, lest it should change the desired density when the operation is restarted.

Comparing the suspension used in this invention with that employed in De Vooys's method which consists of baryte-powder and clay dispersed in water, the powder of pyrite-cinder and other heavy substances in the former are not only far less expensive than barytes, but also can be ground more easily. Although they have the same viscosity, the former is much stabler in density. The following is the result of the tests obtained by comparing their viscosities and stabilities:

In both of them which employ the materials all passed through a 200 meshes-screen, the suspensions are prepared from the same undersized clay, using the same quantity of water. Adding

powder of pyrite-cinder (Sp. gr. 4.7) in the one and adding barytes (sp. gr. 5) in the other, the suspensions of the same sp. gr. 1.6 were produced. An examination showed that both had the standard viscosity, as described above, but as regards the change in the density after they were kept still for two hours, the one employing the powder of pyrite-cinder showed a difference in the density between the upper and lower portions as  $\frac{3}{1000}$ , while the one employing baryte powder showed the difference as high as  $\frac{47}{1000}$ .

By Lessing's method which uses a heavy solution of calcium chloride, it is not only very hard to get a solution of the specific gravity more than 1.43, but also a large quantity of expensive calcium chloride and a great cost for its recovery are necessary. With regard to Conklin's method which employs a suspension of water and ground magnetite which ore is hard and valuable to manufacture steel, it costs much and moreover the suspension used has the serious defect of having unstable density, whereas the suspension in the present process is more effective in many important respects than any other ones employed in the above known methods.

Thus, as in this invention it is possible to dress coals by employing the heavy suspension prepared from almost waste materials with the same highest efficiency as when an expensive heavy solution is used, it contributes both economically and technically to the dressing of coals or similar substances.

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