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PROCESS FOR THE WET MECHANICAL SEPARATION OF RAW MATERIALS

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My invention relates to an improvement in carrying out the wet mechanical separation of raw materials by contrivances or processes respectively which utilize for the separation the differences in the specific gravity of the components of such materials. Such improvement refers particularly to the process of separation which is carried out in jigs, in launder washers, by means of vertical stream washers or by the so-called sink and float process.

I have found that considerable advantage can be obtained when the above mentioned separation processes are carried out in the presence of substances which are known in flotation processes as "collectors" and which are capable of producing a selective flocculation of the specific lighter components of the material to be treated.

As regards the kind and quantity of the "collector" substance or substances to be added in accordance with my invention this depends in general upon the kind or the composition of the material to be treated. I have found, for instance, that for the treatment of ores such additional substances come into consideration as xanthates, eucalyptus oil or oleic acid. For the treatment of coal tar oils or pine oil may be applied whilst for other materials fatty acids, soaps, esters of fatty acids, sulfonated fatty acids and sulfonated higher aliphatic alcohols may be utilised. With special advantage such substances are utilised which are capable of effecting or facilitating the adherence of gas bubbles to the single flocculated particles of those components of the material which are specifically lighter.

The action of the said additional substances may consist therein that the specifically lighter components become hydrophobic in character by the flocculation or that they are charged with little gas bubbles, especially air bubbles. This latter action can be improved, as I have found, by providing for the presence of gases such as air in the liquid separating agent. Preferably considerable quantities of the gas should be present in the liquid or aqueous separating agent. This can be attained, for instance, by introducing gases such as air either continuously or discontinuously into the separating agent, for which inter alia water may be used.

Furthermore, in carrying out the process according to my invention I have found it advantageous when applying the additional substances that the formed flocks or the flocculated complexes mixed with gas bubbles should not be destroyed or that they should always be re-formed. For instance, I have found it advantageous when using jigs to keep the jig water in uniform movement by suitably adapting the number of revolutions and the lifting distances, or by a combination of both measures. The working conditions which are most favourable in each single instance can easily be ascertained by carrying out some preliminary experiments on a small scale.

By working according to my invention in the presence of the said additional auxiliary substances an improvement of the results hitherto obtained is effected. This improvement may be due to the fact that the addition of the auxiliary substances increases the efficacious difference in the specific gravity of the components to be separated. In the "sink and float" separating processes which work as is known with the aid of homogeneous or inhomogeneous stable or instable liquids or emulsions of higher specific gravity the application of substances according to my invention, in addition, results in the advantage that the higher viscosity which is often connected with the higher specific gravity does not show an effect towards the fine particles and, in consequence thereof, the separation even of the finer grain sizes may be carried out more quickly and readily.

The process according to my invention may be applied to all kinds of separators, the components of which show differences in the specific gravity either per se or after some suitable preliminary treatment. I have found that my invention is especially adapted for the separation of ores, coals, other mineral substances as well as salts and finely grained chemical substances.

I prefer to use jigs of the pan-American jig kind such as are recently used with the crushing circulation in the flotation of gold.

AUGUST GOETTE.