

# UNITED STATES PATENT OFFICE.

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PROCESS OF TREATING ORES AND CARBONIFEROUS EARTHS.

959,239.

Specification of Letters Patent.

Patented May 24, 1910.

No Drawing.

Application filed June 26, 1909. Serial No. 504,530.

To all whom it may concern:

Be it known that I, ALFRED ARTHUR LOCKWOOD, chemist, a subject of the King of Great Britain, residing at 12 Minories, in the city of London, England, have invented a new and useful Process of Treating Ores and Carboniferous Earths, of which the following is a specification.

Processes are known in which ores, concentrates or the like, or earths containing carbon in any of its forms, are treated with oily liquids, and the metalliferous portion or the like recovered by magnetic separation, see the specification of U. S. Patent No. 933,717 of Sept. 7, 1909.

It is known that an oxid when admixed with an oily liquid is when agitated with water washed out from the same.

It has been discovered that if the oily liquids (in which term are included animal, vegetable and mineral oils, creosote, fatty acids, soaps and mixtures thereof, and the like) employed for the purpose above described, are made to contain minute quantities of such metallic compounds as are insoluble in water and in alkaline solutions (for the purpose of rendering them less mixable or emulsifiable and more adherent to and retentive of the metalliferous or carboniferous particles) that no precipitation of magnetic oxid of iron occurs when the mixture is agitated with water. There results from this that a magnetic oxid can be employed in the process above mentioned. Such oily liquids are very adherent and in some cases (especially when slimes are present) it may be necessary to add a little acid to prevent the water from becoming sick. Oily liquids are made to acquire these qualities by treatment in general with such substances as would with a saponifiable oil form an insoluble soap, sulfates, sulfids, chlorids, oxids or carbonates being suitable; but when a purified mineral oil, such as kerosene is in question, there must be present in addition to the soluble salt some other substance such as a soluble soap or another oil or a metallic oxid.

In general my process consists in treating an oily liquid, such as oil gas tar, with a metallic compound, such as sulfate of alumina, and mixing the oil thus treated with a suitable quantity of a magnetic oxid, such as oxid of iron, and placing these with water in a vessel which contains the crushed ore.

This mixture is thoroughly agitated, the metallic oxid being prevented from depositing by the sulfate of alumina or its equivalent, and the magnetic oxid is, by the oily liquid, made to adhere to some constituent part of the ore (such as the metallic constituents thereof) in preference to the others and then this mixture is transferred to a magnetic separator as described in my Patent No. 933,717 above mentioned, where the magnetic particles and the particles adhering thereto are separated from the gangue or the other constituents of the ore.

One specific way of conducting the process is as follows:—

Example 1: An oily liquid such as oil gas tar (obtained in the manufacture of oil gas) creosote or kerosene oil is mixed with a one to five per cent. solution of sulfate of alumina in the presence of a soluble soap. The quantity of soluble soap required is about one to five per cent. of the oil used and if an excess of alumina be used it will separate out and may be used over again. When a powdered magnetic oxid is added to the product, it will not be washed out when agitated with water. An ore thus treated can have its constituents separated in a magnetic separator in the manner before described.

Example 2: One part of oil gas tar is mixed with two parts by weight of magnetic oxid of iron and to this mixture a small percentage of a one to five per cent. solution of sulfate of alumina is added and the whole well mixed. This mixture may be used in the magnetic process above mentioned.

In my application for patent filed Nov. 15, 1909, 528,164, I have claimed a somewhat similar process to that herein claimed, but in the process claimed in said application the oiled particles are separated from the unoled particles by a flotation process.

What I claim is:—

1. The process of treating ores hereinbefore described, which consists in adding to an oily liquid a substance which renders it more adherent to the ore and which prevents the washing out of an oxid, and mixing such oily liquid with an ore and a magnetic oxid to cause the magnetic oxid to adhere to some constituent part of the ore in preference to the others, and then magnetically separating the mixture.

2. In a process of treating ores, com-

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bining an oily liquid with a substance which renders it more adherent to the ore and less emulsifiable, and agitating such oily liquid with an ore, magnetic oxid of iron and water, and then separating the mixture.

5 3. In a process of treating ores, mixing an oily liquid with sulfate of alumina to prevent the washing out of an oxid, and

agitating the oily liquid thus treated with an ore, a magnetic oxid and water, and then magnetically separating the mixture.

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Witnesses:

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