

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY.

METHOD OF MAGNETIC-ORE SEPARATION.

SPECIFICATION forming part of Letters Patent No. 485,842, dated November 8, 1892.

Application filed July 20, 1892. Serial No. 440,637. (No specimen.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Treating Ores, (Case No. 958,) of which the following is a specification.

The object of this invention is to produce an effective and economical method for the treatment of low-grade nickeliferous pyritous ores, so as to recover the nickel therefrom and also the cobalt, gold, copper, and other metals or metallic ores that may be present.

I have discovered that where magnetic pyrites, called "pyrrhotite," is nickeliferous, as it usually is to a more or less extent, the nickel is not distributed generally throughout the whole body of the pyrrhotite, but certain crystals are pure pyrrhotite or magnetic pyrites, while other crystals have some of the iron replaced by nickel and sometimes by cobalt, and that the crystals containing the nickel or cobalt are considerably less magnetic than the pure pyrrhotite.

In carrying out my invention I proceed as follows, assuming the ore to contain nickeliferous pyrrhotite or magnetic pyrites, chalcopyrites or copper pyrites, with gold, &c: I first grind the whole of the crude ore, so as to eliminate the pyrrhotite, gold, &c., from the worthless gangue. The crushed ore is then concentrated by jigging or vanning or by any other appropriate concentrating method, thus giving a concentrate containing the nickeliferous pyrrhotite, gold, blende, and galena without any material quantity of quartz or other worthless matter. This concentrate is then passed through a magnetic separator which is capable of working wet ores, or the concentrate is dried and passed through a magnetic separator adapted to work dry ores. The magnetism is so regulated that only the particles of magnetic pyrites which contain no nickel or cobalt are acted upon, the magnetism being too weak to draw away the less magnetic or nickeliferous pyrrhotite. After the pure pyrrhotite has thus been separated the remainder of the concentrate is run through a more powerful magnetic separator, which withdraws the

nickeliferous pyrrhotite, leaving all the other or non-magnetic materials. The nickeliferous pyrrhotite which is obtained in this way, although small in quantity compared with the whole amount of ore, will be sufficiently rich to be put into a matte by the regular methods. The remainder of the concentrate is then roasted in a closed cylinder with slight access of air, if desirable, to render the copper pyrites magnetic, when the magnetic copper pyrites may be withdrawn from the rest of the material by a magnetic separator, as explained in my patent, No. 465,250. After the copper pyrites have been withdrawn from the concentrate the remainder, containing the gold, silver, zinc, lead, &c., of the original ore, is worked in the wet way or matted and worked electrolytically, as will be well understood.

What I claim is—

1. The process of separating nickeliferous from non-nickeliferous pyrrhotite where both occur in the same ore, consisting in subjecting the crushed material to a magnetic action of such strength that, due to the difference in magnetic capacity of the nickeliferous and non-nickeliferous pyrrhotite, the non-nickeliferous pyrrhotite will be acted upon magnetically, while the nickeliferous pyrrhotite will not be thus acted upon, substantially as set forth.

2. The process of treating ores containing nickeliferous and non-nickeliferous pyrrhotite, consisting in first crushing the ore to free the particles of pyrites from the gangue and other metals, passing the material through a magnetic separator of a sufficient strength to withdraw all the magnetic pyrites, and then passing the magnetic pyrites through another magnetic separator having a sufficient strength to act upon the non-nickeliferous pyrrhotite, but not upon the nickeliferous pyrrhotite, substantially as set forth.

This specification signed and witnessed this 9th day of July, 1892.

THOS. A. EDISON.

Witnesses:

RICHARD N. DYER,
EUGENE CONRAN.