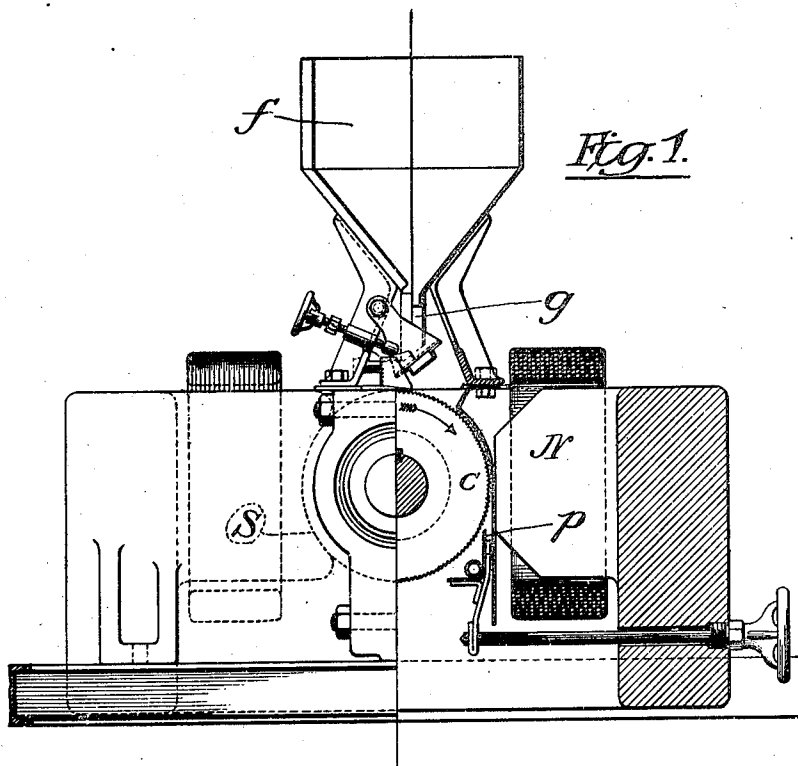


No. 861,782.

PATENTED JULY 30, 1907.

H. H. WAIT.
PROCESS OF SEPARATING ORE.
APPLICATION FILED MAR. 20, 1905.

2 SHEETS—SHEET 1.



Witnesses:

Ed. G. Brown
N. W. Lusk

Inventor:

Henry H. Wait
By Barton & Anner
Attys.

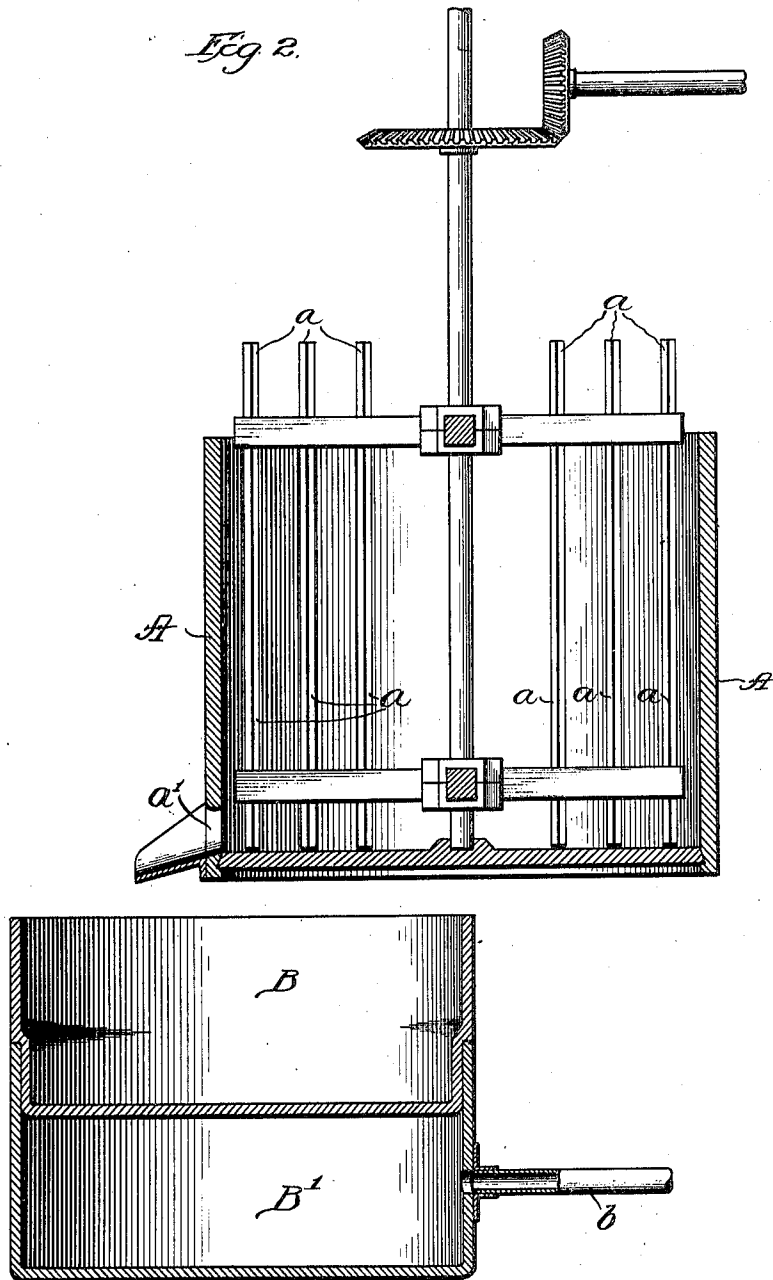
No. 861,782.

PATENTED JULY 30, 1907.

H. H. WAIT.
PROCESS OF SEPARATING ORE.
APPLICATION FILED MAR. 20, 1906.

2 SHEETS—SHEET 2.

Fig 2.



Witnesses:
Geo. Davidson
J. J. Phillips

Inventor:
Henry H. Wait,
By Barton, Danner & Folks,
Att'ys.

UNITED STATES PATENT OFFICE.

HENRY H. WAIT, OF CHICAGO, ILLINOIS, ASSIGNOR TO INTERNATIONAL SEPARATOR COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW JERSEY.

PROCESS OF SEPARATING ORE.

No. 861,782.

Specification of Letters Patent.

Patented July 30, 1907.

Application filed March 20, 1905. Serial No. 251,076.

To all whom it may concern:

Be it known that I, HENRY H. WAIT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Processes of Separating Ore, of which the following is a full, clear, concise, and exact description.

My invention relates to a process of separating ores, with special reference to mixtures of materials which are so nearly alike in magnetic permeability, or of such low permeability that they cannot be commercially separated by an ordinary magnetic separator.

In accordance with my invention, I take advantage of differences in the physical or chemical characteristics of the ingredients, to render one or more of them susceptible of magnetic attraction and separation from the others. This can be done in many cases by treating the mixture with a substance which will change the magnetic characteristics of certain of the particles in the mixture without to the same extent effecting the others, so producing an artificial difference in permeability.

In the accompanying drawings Figure 1 is a view half in elevation and half in section of a magnetic separator which may be used in carrying out my process; and Fig. 2 is a sectional view, somewhat diagrammatic, of a mixing and drying apparatus which may be used for impregnating the ore and subsequently drying the same.

The separator consists in its elements of a laminated armature *c*, having teeth upon its periphery, arranged to rotate between two opposing magnet poles *N*, *S*, of opposite polarity. Means are provided, as shown, for feeding the material to the top of the rotating cylinder which carries it around past one of the pole pieces, *N*. The more magnetic particles are thus attracted to the teeth of the cylinder and held in the rotation thereof until they have been carried beyond the path of the non-magnetic materials which fall straight down over the side of the cylinder. A divider *p* is shown in position to separate the two classes of materials.

The mixer consists of a vessel *A* on the interior of which are suitably mounted agitating blades *a*. The mixture is placed in the vessel *A* and the solution with which it is to be impregnated poured upon it. After being thoroughly stirred up by the blades *a*, the mixture is passed through the opening *a'* into a vessel *B* which may be heated in any suitable manner, as for example, by steam admitted through the pipe *b* into a chamber *B'* beneath the vessel *B*.

To return to a description of my improved process, which is not dependent upon any particular type of machine, the mixture of materials to be separated can be treated with a solution which will coat the particles of one class of material, such as oxid of iron, formed either by chemical combination with the particle itself, or by physical adhesion thereto. The particles having such a deposit of magnetic material upon their surface may then be removed from the mixture by magnetic attraction. To give a specific illustration, a mixture of molybdenite and mica cannot be completely separated in an ordinary magnetic separator, but the mica differs widely from the molybdenite in its physical characteristics, notably in that it is more porous. I have found that a separation of such mixture can be effected as follows: The mixture, having been reduced to a finely-divided state, such for instance as would pass through a sieve of quarter-inch mesh, is treated with a solution of an iron salt such as iron sulfate, and then heated or exposed to atmospheric conditions. The mica being porous in its nature, receives and retains upon its surface and in its crevices a deposit of magnetically permeable iron oxid, and so is given in effect, a magnetic character which renders it susceptible of magnetic attraction and separation from the molybdenite, which is not so affected.

It is evident that the treatment in each case must be adapted to the particular ingredients in question to cause what may be termed an artificial working difference in permeability; and the nature of the treatment to be given can readily be determined by one skilled in the art. After such treatment, it simply remains to subject the mixture to the action of a sufficiently intense magnetic field of force, in a well-known type of magnetic separator, to remove the more permeable particles. Thus, by reference to the magnetic separator shown in the drawing, the mixture is placed in the hopper *f*, and slowly fed upon the rotating cylinder *c*, which is magnetized by induction from pole pieces *N* and *S*. The non-magnetic material passing over the cylinder is unaffected thereby, and falls straight down, while the material which has been artificially rendered susceptible is attracted by the teeth on the surface of the cylinder, and carried thereby past the edge of the divider plate *p*, thus effecting a separation.

I claim:—

1. The herein described process of separating ores having different degrees of porosity from a mixture, which consists in impregnating the mixture with a solution of an

iron salt, subjecting the same to an oxidizing agency to form a magnetically permeable oxid upon the more porous material, whereby its particles are rendered susceptible of magnetic attraction, and then passing the mixture through
5 a magnetic separator to remove the particles which are thus artificially rendered susceptible.

2. The herein described process of separating mica from molybdenite which consists in impregnating the mixture of such ores with a solution of an iron salt, exposing the

impregnated ore to the air and finally subjecting the mixture to the action of an intense magnetic field, whereby the mica is attracted and removed. 10

In witness whereof, I hereunto subscribe my name this 13th day of March A. D., 1905.

HENRY H. WAIT.

Witnesses:

IRVING MACDONALD,
DE WITT C. TANNER.