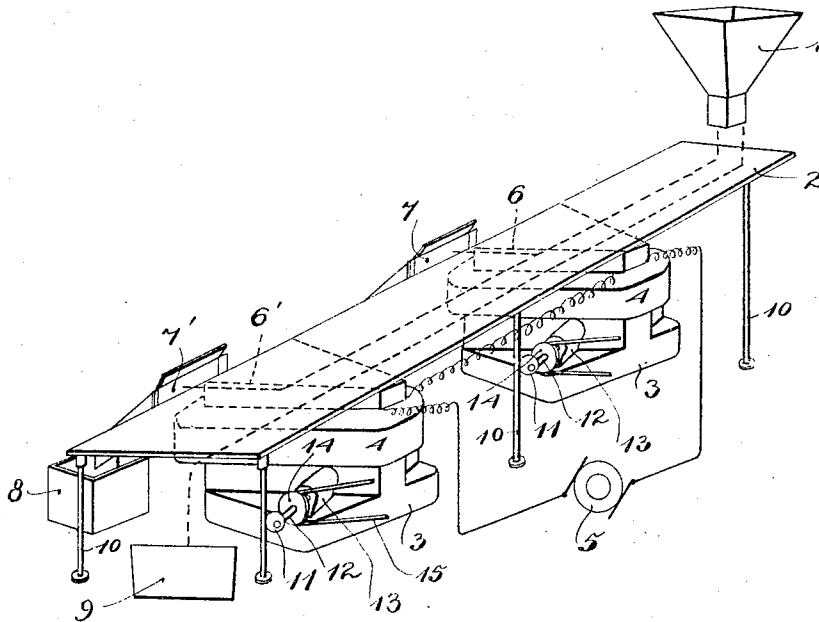


No. 823,301.

PATENTED JUNE 12, 1906.

F. T. SNYDER.
MAGNETIC SEPARATOR.
APPLICATION FILED SEPT. 2, 1902.



Witnesses.
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Att'y

UNITED STATES PATENT OFFICE.

FREDERICK T. SNYDER, OF KANSAS CITY, MISSOURI, ASSIGNOR, BY
MESNE ASSIGNMENTS, TO INTERNATIONAL SEPARATOR COM-
PANY, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW JERSEY.

MAGNETIC SEPARATOR.

No. 823,301.

Specification of Letters Patent.

Patented June 12, 1906.

Application filed September 2, 1902. Serial No. 121,795.

To all whom it may concern:

Be it known that I, FREDERICK T. SNYDER, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented a certain new and useful Improvement in Magnetic Separators, (Case No. 1,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to magnetic separators and, generally speaking, contemplates the use of the edge of a magnetic field or narrow area of magnetic concentration, as a riffle, in a line diagonal to the main direction of passage of the materials to be separated to arrest and divert the more permeable particles, in combination with means for imparting a reciprocating motion to said materials to cause a net travel of the permeable particles along the riffle, whereby said particles are separated from the remainder of the material, which continues its general direction of travel.

I provide an inclined chute, preferably in the shape of a plane, the material to be separated being fed to the chute through a hopper. Magnets, either permanent or electrically energized, are disposed below the chute so that an edge of the pole-faces thereof is disposed diagonally across the bottom of the chute. As the mixture of permeable and non-permeable particles now rolls down the chute the more permeable particles are retarded at the diagonal magnetic edges presented by the magnets, the particles being guided toward the side of the chute to be deposited in suitably-placed receptacles. The non-permeable and lesser permeable particles roll straight down the inclined chute and fall into a different receptacle, the permeable particles being thus separated from the others.

By presenting several magnetic edges to the chute a more thorough separation is assured, for should a permeable particle pass by the first magnetic edge it will be arrested and guided by the succeeding edge or edges.

If the inclination of the path along which the diverted particles tend to move be not sufficient to cause them to slide freely, as would be the case when the chute were not inclined, the arrested particles may be made

to move to one side by shaking or vibrating the chute back and forth in a direction substantially parallel with the edges of the magnetic field, which edges are preferably parallel.

In the drawing I have illustrated apparatus for causing separation of permeable particles by means of magnetic riffles.

A hopper 1 serves to feed the material to be separated to the chute 2, which may be inclined, as shown, and which is preferably composed of material having a low magnetic permeability. Cores 3 3 may be permanently magnetized or electrically energized by means of energizing-coils 4 4, connected with a source of current 5. These magnets are disposed below the chute 2 so that the edges 6 6' of the pole-faces thereof are in contact with or very close to the bottom surface of the chute and extending in a diagonal direction. The magnetic field created by the magnets will be convergent toward the edges, and as the material to be separated now approaches the diagonal magnetic edge 6 the more permeable particles will be attracted and retarded and guided along this edge to be deposited into a spout 7. Should the edge 6 be unable to arrest and guide all the more permeable particles, these particles will pass on until the edge 6' is reached and will be guided along this edge and into a spout 7'. Any number of edges may thus be presented to the chute and a thorough separation of the permeable particles assured. The permeable particles may be received in receptacles 8, while the non-permeable particles pass straight down the chute unattracted by the magnets, to be deposited in a receptacle 9.

To assist the guidance of the permeable particles toward the side of the chute, I provide cam mechanism for shaking or vibrating the chute, and the chute may be mounted upon spring-supports 10 10. Cam-wheels 11 11, secured to shafts 12 12, mounted in bearings 13 13, may be driven through the medium of pulleys 14 14 and belts 15 15, the cams engaging one or more of the supports 10 to cause vibration of the chute in a direction substantially parallel to the magnetic edges.

The magnetic edges instead of being parallel to each other, as shown, may be disposed at various angles, and other changes in the

form and structure of the various parts may be readily made without departing from the principle and scope of the invention. I do not, therefore, wish to be limited to the precise structure herein shown; but

I claim as new and desire to secure by Letters Patent—

1. In a magnetic separator, the combination with a plane surface, of means for feeding materials to be separated to said surface, means for causing magnetic riffles diagonally along said surface, and means for vibrating said surface in a direction substantially parallel to said riffles, substantially as described.

2. In a magnetic separator, the combination with an inclined chute in the shape of a plane, of means for feeding materials to be separated to said chute, magnetic edges presented to the under side of said chute and extending diagonally across said chute to form magnetic riffles in said chute, and means for causing vibration of said chute in a direction substantially parallel to said magnetic edges, substantially as described.

3. In a magnetic separator, the combination with a sloping table and means for feeding material to be separated upon the table at the top to pass said materials down the slope, of means for establishing a magnetic field through the table in a line diagonal to the line of passage of said material to form a magnetic riffle, and means for imparting a differential reciprocating motion to said table

substantially parallel to the line of said magnetic field, adapted to cause a net movement of materials along said riffle.

4. In a magnetic separator, the combination with a table and means for passing materials to be separated along the same, of magnetic bodies adapted to form a series of narrow areas of magnetic concentration extending in lines diagonal to the direction of passage of said materials, and means for imparting a differential reciprocating motion to the table to cause a net movement of the attracted material along said areas of magnetic concentration.

5. In a magnetic separator, the combination with an inclined chute, of means for feeding materials to said chute, a magnet below the chute having one of its polar edges disposed diagonally across the bottom of the chute to divert permeable particles from the stream of material passing down the chute, supports for said chute, and rotatable cams for shaking said supports to vibrate said chute in a direction substantially parallel to the said polar edge to facilitate the travel of said diverted particles.

In witness whereof I hereunto subscribe my name this 22d day of August, A. D. 1902.

FREDERICK T. SNYDER.

Witnesses:

GEORGE L. CRAGG,
HARVEY L. HANSON.