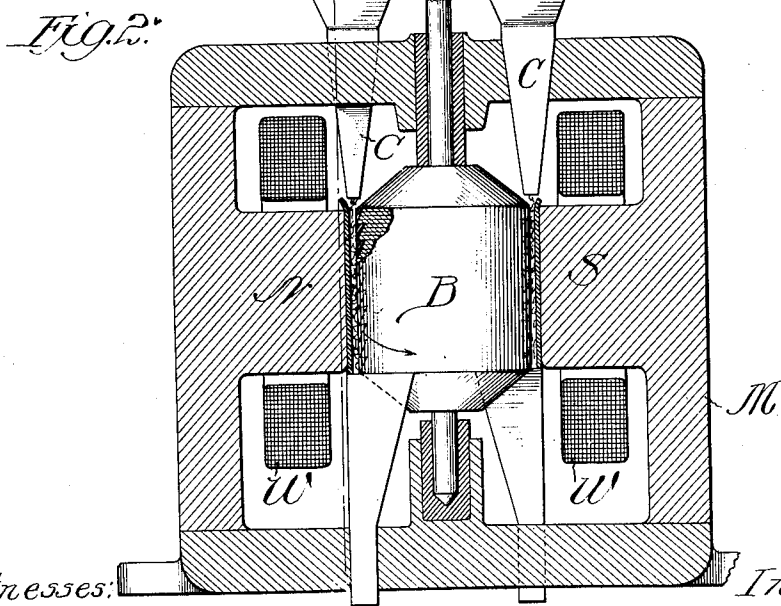
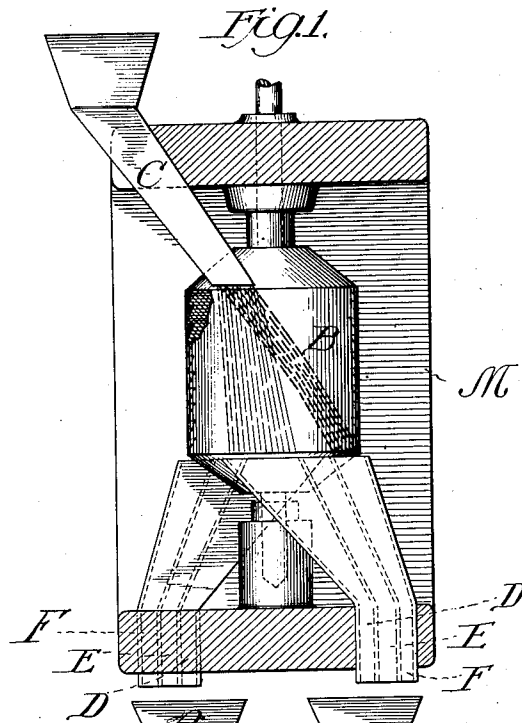


No. 832,642.

PATENTED OCT. 9, 1906.

H. H. WAIT.
MAGNETIC ORE SEPARATOR.
APPLICATION FILED MAR. 20, 1905.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 3.

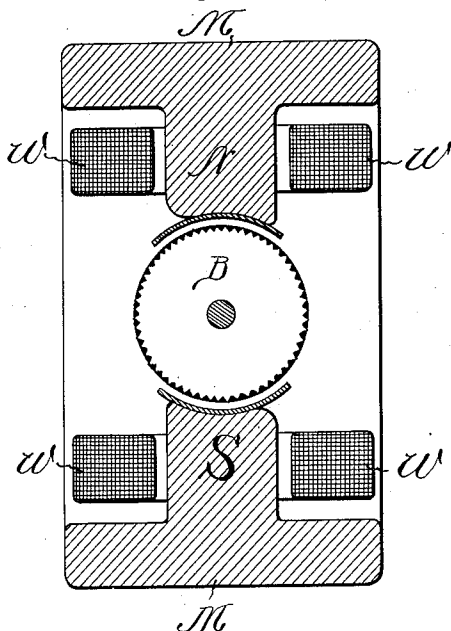


Fig. 4.

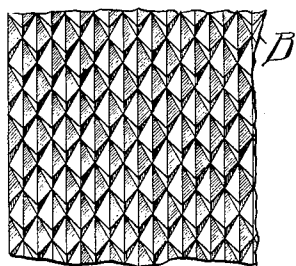
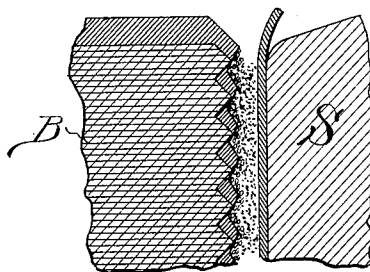


Fig. 5.



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MAGNETIC ORE-SEPARATOR.

No. 832,642.

Specification of Letters Patent.

Patented Oct. 9, 1906.

Application filed March 20, 1905. Serial No. 251,072.

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 Magnetic Ore-Separators, of which the following is a full, clear, concise, and exact description.

My invention relates to a magnetic separator; and its object is to provide a simple, efficient, and economical form of machine which may be worked either with dry ore or in a liquid medium and in which the material to be treated will be subjected to the action of an intense magnetic field of considerable extent in such a manner that the magnetically-susceptible particles will be effectively removed and not entrained with the non-magnetic material.

The invention further contemplates means for preventing non-magnetic material from being entrained and carried along with the magnetic particles.

I will describe my invention particularly by reference to the accompanying drawings, and the parts, improvements, or combinations which I regard as novel will be pointed out in the appended claims.

In the drawings, Figure 1 is a vertical sectional elevation of the machine. Fig. 2 is also a vertical sectional elevation, but is taken on a plane at right angles to that of Fig. 1. Fig. 3 is a sectional plan view. Fig. 4 is a detail view of a portion of the armature-surface, showing teeth of a form especially adapted to this type of machine; and Fig. 5 is a detail sectional view showing another form of working surface for the armature designed to prevent non-magnetic particles from being entrained by the magnetic particles adhering to the armature-surface.

The same letters of reference designate the same parts wherever they are shown.

The machine is of a general type in which a separating-cylinder is arranged to revolve upon a substantially vertical axis, a magnet-pole being applied to the face of the cylinder and the material to be separated being fed into the air-gap between the magnet-pole and the cylinder, the magnetic particles being carried around in the rotation of said cylinder and discharged at a region circumferentially distant from the place of discharge of the non-magnetic material.

Referring to the drawings, B is the cylindrical armature mounted to rotate upon a vertical axis between the poles N S of a powerful magnet M, the pole-pieces of said magnet being provided with field-windings W W, to which an electric current may be supplied from any suitable source. The armature B is laminated transversely to its axis of rotation in order to prevent eddy-currents and to permit it to turn in the intense magnetic field with a minimum expenditure of energy.

Troughs or hoppers C C are arranged to receive the material to be concentrated and to direct the same between the magnet-poles N and S and the surface of the revolving armature, and the products are collected at the bottom in the discharge-chutes D D, E E, and F F. It is intended that the magnetically-permeable particles shall be attracted to the surface of the armature B and adhere to said armature in its rotation until it reaches the neutral zone between the two opposing pole-pieces, where it will be released and will fall into the discharge-chutes F F. The armature is therefore provided with magnetic teeth, edges, or projections upon which the lines of force will be conveyed, the magnetic attraction being always in the direction of converging lines of force. It will be seen that the magnetic particles will be given three movements—first, the downward movement due to gravity; second, the inward movement toward the surface of the armature until they adhere thereto, and, third, the circumferential movement due to the rotation of the armature. To these may be added, fourth, the final release and falling down into the collecting-chute. The non-magnetic material, on the other hand, tends to fall directly down. Centrifugal force tends to keep the non-magnetic material thrown out and clear of the armature-drum.

In order to prevent any considerable portion of the non-magnetic material from being entrained with the magnetic material and carried around therewith in the rotation of the cylinder, the surface of the cylinder may be made smooth mechanically by filling the spaces between the teeth or projections with non-magnetic material. In Fig. 4, however, a form of tooth or projection is illustrated which would be especially advantageous, the surfaces being inclined at so steep an angle

that particles which are not positively held on by magnetic attraction will find no places to lodge and will fall off. It will be noted that the teeth in Fig. 4 are in the form of pyramids pointing downwardly and arranged so as to present sharp edges to the falling material, the pyramids being in staggered rows, so that the material cannot escape the lines of force concentrating upon the edges thereof.

In Fig. 5 I have illustrated the toothed surface provided with an uneven filling of non-magnetic material forming inclined ledges which project slightly above and beyond the points of the teeth or projections. In other words, the point of the tooth comes to the surface on that portion of the physical surface of the armature which slopes inward, or on the under side of the projecting ledge of non-magnetic material. The magnetic particles adhering to the points of the teeth are thus shielded to a certain extent from the falling non-magnetic particles, to avoid collecting such non-magnetic particles above them. The sloping surface of the non-magnetic ledges are too steep to allow the material to rest thereon; but the magnetic particles are drawn toward the points of the teeth which come to the surface on the under sides of such ledges.

A considerable advantage results from the arrangement of the armature-cylinder between opposed pole-pieces of opposite polarity in that the magnetic attraction on the armature is approximately balanced, and neutral points are established on the surface of the armature between the opposing poles, at which points the attracted material will be released and not carried clear around. By arranging the cylinder to rotate upon a vertical axis instead of horizontally both the air-gaps between the cylinder and the magnet-poles may be utilized for the passage of material, so that none of the magnetizing force is wasted on the idle air-gap.

It will be understood that the drawings herewith presented are more or less diagrammatic in character and that various modifications may be readily made by those skilled

in the art without departing from the constructional principles indicated.

Having described my invention, I claim as new, and desire to secure by Letters Patent, the following:

1. In a magnetic separator, the combination with a separating-armature built up of toothed laminae, the teeth of said laminae being arranged in vertical rows, of non-magnetic material in the space between said teeth, said material forming inclined ledges projecting above and beyond the ends of said teeth.

2. In a magnetic separator, a separating element having an approximately vertical ore-carrying surface arranged to move laterally, and provided with permeable magnetic projections, and non-magnetic material covering said surface and forming inclined ledges upon said surface projecting above and beyond the ends of said permeable projections.

3. In a magnetic separator, the combination with an ore-carrier revolving on a substantially vertical axis, said carrier being built up of transverse laminae, said laminae having teeth for causing convergences of magnetic flux at the periphery of the carrier, a non-magnetic filling between said teeth, said material forming inclined ledges projecting above and beyond the ends of said teeth, a magnet-pole facing said carrier, and means for feeding material to be separated between said pole and carrier.

4. In a magnetic separator, a separating element having an approximately vertical ore-carrying surface arranged to move laterally, said surface having permeable magnetic teeth or projections, and non-magnetic material filling the spaces between said teeth to form inclined ledges projecting above and beyond the ends of said teeth.

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

HENRY H. WAIT.

Witnesses:

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