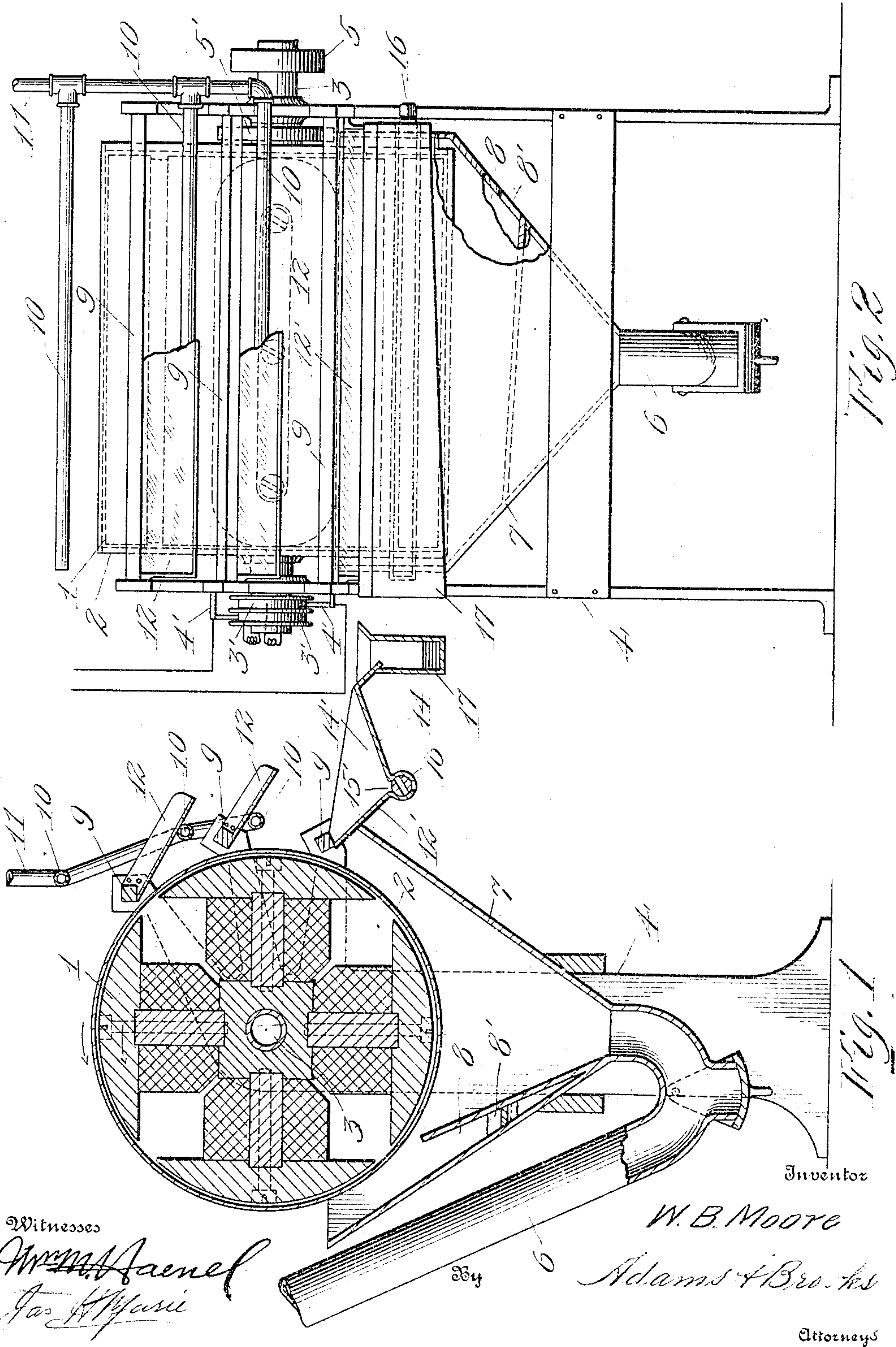


W. B. MOORE.
MAGNETIC SEPARATOR.
APPLICATION FILED AUG. 31, 1906.

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Patented June 7, 1910.



UNITED STATES PATENT OFFICE.

WALTER B. MOORE, OF SEATTLE, WASHINGTON.

MAGNETIC SEPARATOR.

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Specification of Letters Patent.

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Application filed August 31, 1906. Serial No. 332,870.

To all whom it may concern:

Be it known that I, WALTER B. MOORE, a citizen of the United States of America, and a resident of the city of Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Magnetic Separators, of which the following is a specification.

My invention has for its primary object to provide a simplified and efficient apparatus for treating finely divided materials such as sand or gangue containing magnetic particles or magnetite, for the purpose of separating the magnetic from the non-magnetic particles, and is adapted for carrying out the process forming the subject of another application for patent executed by me on even date herewith, the same having been filed August 31, 1906, and bearing Serial No. 332,869.

With the above and other objects referred to hereinafter in view the invention resides in the construction, combination and arrangement of parts as set forth in this specification and defined in the appended claims.

In the accompanying drawing, wherein like reference characters designate corresponding parts throughout, there is illustrated one form of embodiment of the invention capable of carrying the same into practical operation.

With reference to the drawing Figure 1 is a vertical transverse section of the apparatus, and Fig. 2 is a side elevation of the same viewed from the right of Fig. 1, portions of some of the parts being broken away.

In carrying out my invention, I provide a magnetic separating means conveniently consisting of an electro-magnet 1, and a shield 2 in the form of a waterproof casing 2 in which the magnet is inclosed.

The magnet 1, as shown, is of the multipolar form and secured to a tubular shaft 3 which fits rotatably in suitable hubs secured to shield 2 and is supported in a frame 4 for rotation. The said shaft and shield having secured thereto drive pulleys 5 and 5' respectively, to which power is applied to rotate the magnet and shield independently of each other.

The coils of magnet 1 are electrically connected with suitable collecting rings 3', which are secured to shaft 3 and contact with respective brushes 4' connected with a suitable electrical energizer.

The materials to be treated are passed

into the magnetic field of magnet 1, preferably in a wet state. This is conveniently accomplished by feeding the materials mixed with water into a conduit 6, which discharges upwardly into a chamber, as 7, having upwardly flaring walls embracing the lower portion of shield 2. In the chamber 7 is a passageway or trough 8, which communicates with a discharge opening 8' and is arranged with the upper edge of one of its side walls adjacent the downwardly moving side of said shield. This last named wall is inclined upwardly and outwardly from the lower portion of said chamber as clearly shown in Fig. 1. Thus the materials will be carried into the magnetic field and suspended therein by the water, thereby permitting magnet 1 to draw and hold the magnetic particles or magnetite to shield 2 while the non-magnetic matter is carried by the overflow into trough 8 and thence discharged through the opening 8'.

In conjunction with the magnetic separating means I provide means for magnetically transferring the magnetic particles or magnetite extracted thereby from the mass of materials, the same conveniently consisting of permeable members as 9, which are disposed in the magnetic field of magnet 1, preferably at its upwardly moving side, close to but not in contact with the shield 2. In the construction shown the members 9 are in the form of rectangular bars which are arranged diagonally relatively to the periphery of shield 2 and extend longitudinally thereof.

Reference numerals 12—12 and 12' indicate suitable supports which extend outwardly, each from its respective member 9, and 10 designates jet tubes connected with a delivery pipe 11 and suitably arranged to direct water for discharge toward respective members 9.

The support 12' is provided with an extension 14 which is inclined upwardly in an outward direction, thereby forming a recess 14' at the base of which the support is provided with an opening 15' communicating with a valve, as 16.

The members 9 being in the magnetic field of magnet 1, lines of force passing through said field will be concentrated therein and so energize said members that they will have stronger attraction for the magnetic particles or magnetite than will the magnet. Consequently as fast as the magnetic ma-

materials are carried by shield 2 into the field of force of the lower member 9 they will be caused to leave the shield and cling to said member. If, however, shield 2 should be overloaded with magnetic materials, a part thereof will be conveyed beyond the lower member and removed from said shield by the succeeding members 9.

The magnetic particles or magnetite clinging to the members 9 are subjected to a reversal of magnetic polarity, by reason of the movement of magnet 1, and are thereby caused to travel end over end across said members and their respective supports. During the end over end movements of the particles such non-magnetic matter as may be carried therewith in magnetic entanglements will be freed and pass with the water discharging from the jet tubes 10 to the recess 14', while the magnetic particles falling from the supports 12 will be caught on extension 14 and travel thereacross, for deposit in a trough 17, in company with those passing from support 12'. Thus the pure magnetic concentrate is deposited in one place, and the non-magnetic materials which are carried therewith from shield 2 in another place from whence they may be removed, by opening valve 16, for subsequent treatment to recover such values as may be combined therewith.

Having thus described my invention what I claim as new, and desire to secure by Letters Patent of the United States of America, is:—

1. In a magnetic separator, the combination of a support to which materials are fed, said support having an extension which is inclined upwardly in an outward direction, there being an opening at the base of said extension, a valve for closing said opening, and a magnet movable for presenting poles of opposite polarity to cause the magnetic particles to travel on said support.

2. An apparatus for separating magnetic from non-magnetic particles comprising a rotatable magnet, means for directing the materials into the magnetic field of said magnet beneath the same, means movable about said magnet for conveying the particles attracted thereby, a plurality of permeable members disposed in said field one above the other adjacent said conveying means, supports extending from said members, means for directing water to flow upon said supports, the upper of said supports discharging onto the lower one, for the purpose specified.

3. In a magnetic separator the combination of a magnet supported for movement, a movable shield extending about said magnet for conveying the magnetic particles attracted by said magnet, a chamber embracing the lower portion of said shield, the walls of said chamber being inclined outwardly in an upward direction, means for directing a mixture of water and the materials to be separated for discharge upwardly into said chamber, an upwardly and outwardly inclined partition in said chamber extending in proximity to the under side of said shield, said chamber being provided with an outlet at the outer side of said partition, and a member in the magnetic field of said magnet for attracting the particles conveyed on said shield.

4. An apparatus for separating magnetic from non-magnetic particles comprising a chamber, a rotatable magnet, means for directing materials to be separated for discharge into said chamber, means movable about said magnet and having its lower portion arranged in said chamber for conveying the particles attracted by said magnet, a permeable member arranged above said chamber for attracting the magnetic particles conveyed on said shield, a downwardly inclined support extending outwardly from said member having an upwardly inclined extension at its outer end portion thereby forming a recess, there being an opening at the base of said extension normally closed by a valve, other permeable members arranged above said first named permeable member, and supports leading from said last named permeable members arranged to discharge onto said first named support.

5. A magnetic separator comprising a rotating magnet, means for directing material into the magnetic field thereof, a permeable member in said field at the upwardly moving side of said magnet, conveying means extending about said magnet for transporting materials attracted by said magnet into the field of force of said member, and a support extending outwardly from said member on which the materials attracted by said member are impelled in an outward direction by said magnet.

Signed at Seattle, Washington this 23 day of August 1906.

WALTER B. MOORE.

Witnesses:

JOHN W. FILKINS,
S. B. FOLEY.