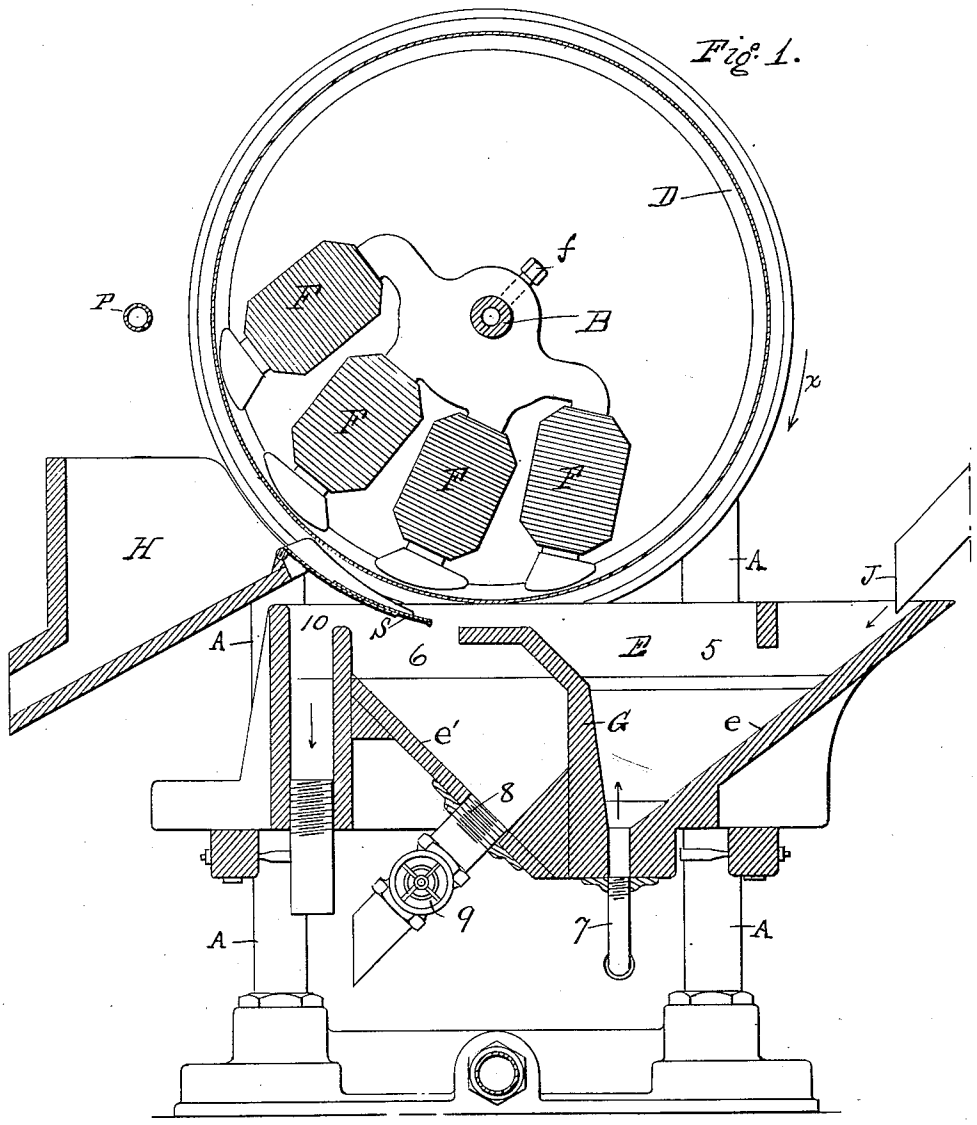
G. E. ÖHRN.

MAGNETIC ORE SEPARATOR.

APPLICATION FILED JUNE 15, 1909.

946,394. Patented Jan. 11, 1910.

Fig. 1.



WITNESSES

L. H. Grote

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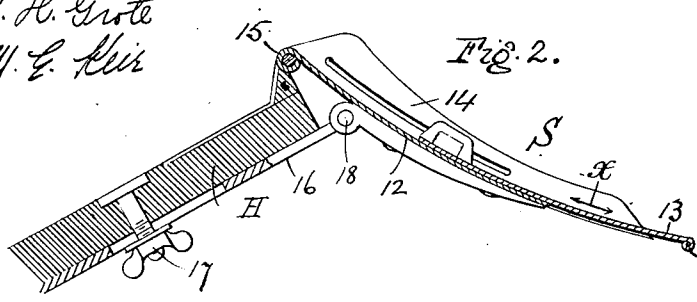
Fig. 2.



INVENTOR

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BY

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UNITED STATES PATENT OFFICE.

GUSTAF EMIL ÖHRN, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN GRONDAL KJELLIN COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

MAGNETIC ORE-SEPARATOR.

946,394. Specification of Letters Patent. Patented Jan. 11, 1910.

Application filed June 15, 1909. Serial No. 502,399.

To all whom it may concern:

Be it known that I, GUSTAF EMIL ÖHRN, a subject of the King of Sweden, at present residing in the city of New York, in the county and State of New York, have invented certain new and useful Improvements in Magnetic Ore-Separators, of which the following is a specification.

My invention relates more particularly to improvements in the apparatus for the magnetic separation of pulverized ores, forming the subject of the Grondal patent 812,170, dated Feb. 6, 1906, and the object of my invention is to so construct the apparatus as to obtain a larger proportion of the magnetite or concentrates from the ore, and to leave tailings with so small a proportion of concentrates therein as to make unnecessary the re-separating operation commonly employed to recover as middlings the quantity of magnetite usually carried off with the tailings.

In the accompanying drawing, Figure 1, shows in sectional elevation a construction of separator embodying my invention; and Fig. 2 is a section of a detail drawn to a larger scale.

A is any stationary construction of frame supporting a horizontal stationary shaft B, on which is revolved in the direction of the arrow a hollow drum D of magnetically indifferent material, such as zinc or brass. Upon this shaft is supported within the drum a series of suitable electromagnets F so that these electromagnets may be adjusted rotarily on the stationary shaft and secured after adjustment by suitable set screws *f*. Immediately under the drum with its magnets thus mounted is a vessel E, preferably with inclined end walls *e* and e^1 and divided into two compartments 5 and 6 by a partition G extending under the center of the drum. Into the bottom of the compartment 5 opens a pipe 7 for the admission of water, while in the bottom of the chamber 6 is an outlet 8 controlled by a valve 9 for the discharge of tailings. At 10 is an overflow discharge from the chamber 6.

The pulverized ore being fed into the upper part of the chamber 5 at J, is carried along suspended in the water near the surface toward this discharge 10 and under the revolving drum, and the concentrates are lifted up out of the water by the attraction of the magnets and adhere to the surface of the drum. At H is a chute or conduit for receiving and carrying off the concentrates or pure ores which have been lifted out of the water and carried around by the revolving drum until they drop off or are removed therefrom by a stream of water or other means, as they are about to leave the magnetic field. Such a stream of water may be provided from a transverse pipe P with perforations to direct jets of water toward the drum and so remove the ore clinging to the surface of the drum.

As thus far described, the apparatus may be said to correspond in all essential parts with the apparatus of the Grondal patent before referred to, but in such apparatus it was found in practice that an appreciable amount of the magnetic ore always used to fall from the drum back into the water and was carried away with the slime water at the discharge 10. In addition to the magnetite thus falling back into the water from the drum, there were particles of such fineness that the surface tension of the water was stronger than the magnetic attraction of the drum and they were consequently never drawn up to the drum but were carried along to the overflow and discharged with the tailings. This was particularly true of particles of inferior grade. The consequence of this was that the material from the discharge 10 always contained such a large percentage of magnetite that the material passing off at 10 had to be collected in order to subject it to a re-separating process to thereby obtain the magnetite as middlings. To do away with this trouble and to get a larger proportion of concentrates at the collecting conduit H and to leave the tailings so free from magnetite as to be no longer worth a re-separating process, I provide over the discharge 10 and extending over the chamber 6 some distance an adjustable inclined shield S extending downwardly from the forward edge of the conduit H. The forward lower edge of this shield S extends just below the level of the water or

sufficiently down into the water to prevent the concentrates which may fall from the revolving drum onto it and slide down it, from being carried away to the overflow 10. The lumps which thus fall from the drum upon the shield S will break up more or less, and the particles of concentrates will be lifted up again to the drum magnets by the magnetic field, and will be carried up to a point where they will drop or be caused to drop into the conduit H in the usual way. Furthermore the fine particles being stopped at the shield gather in lumps, the surface tension of which is less than the magnetic attraction and they are consequently lifted to the drum and carried to the edge of the magnetic field where they are dropped into the conduit H. By this improvement practically no middlings will be obtained at the discharge 10 so that the machine will give only two products, namely, finished concentrates and tailings.

The shield S is preferably made adjustable according to the character of the ore to be treated. For the sake of simplicity I have not shown in Fig. 1 any adjustable devices, but in Fig. 2 I have illustrated one suitable means of adjustment. In this view the shield S is shown as made in two parts 12 and 13, one overlapping the other, the part 12 being secured to slotted side bars 14 hinged at 15 to the forward edge of the conduit H, while the part 13 may be adjusted upon the side bars 14 in the direction of the arrow x to advance or retract the forward edge of the shield. The depth of the forward edge of the shield in the water may be adjusted by moving the whole shield upon its hinge 15 by a slotted bar 16 hinged to the underside of the shield at 18 and after adjustment clamped by a thumb nut 17 against the underside of the conduit H.

I claim as my invention—

1. An apparatus for magnetically separating ores, comprising a magnet, a revolving drum, two vessels, one to receive the ore suspended in water and to overflow the same into the second compartment, with a discharge from the latter, a conduit to receive the separated pure ores, and a shield extending downwardly from said conduit over said discharge from the second compartment and with only its forward edge in the water and being arranged to prevent the extracted ore from falling back into the water in said vessel and being carried over said discharge, as and for the purpose set forth.

2. An apparatus for magnetically separating ores, comprising a magnet, a revolving drum, two vessels, one to receive the ore suspended in water and to overflow the same into the second compartment, with a discharge from the latter, a conduit to receive the separated pure ores extracted by said drum from the water in said vessels, and a shield in proximity to said drum extending downwardly from said conduit over said discharge from the second compartment and with only its forward edge in the water and being arranged to prevent the extracted ore from falling back into the water in said vessel and being carried over said discharge, as and for the purpose set forth.

3. In apparatus of the character described, means for containing a flowing liquid in which ore is suspended, a moving surface above said liquid and magnetic means for lifting the ore from said liquid to said moving surface, a conduit arranged to receive the ore discharged from said surface, and a shield having one edge in the suspension liquid and being arranged to prevent the ore dropped from said surface from falling into said liquid before reaching said conduit and to hold the same in position to be again lifted to said surface by said magnetic means.

4. In apparatus of the character described, means for containing a flowing liquid in which ore is suspended, a moving surface above said liquid and magnetic means for lifting the ore from said liquid to said moving surface, a conduit arranged to receive the ore discharged from said moving surface and a detaining shield extending at least partially into the suspension liquid to stop and sustain ore particles suspended near the surface of said flowing liquid.

5. In apparatus of the character described, means for containing a flowing liquid in which ore is suspended, a moving surface above said liquid and magnetic means for lifting the ore from said liquid to said moving surface, a conduit arranged to receive the ore discharged from said moving surface and a detaining shield extending at least partially into the suspension liquid to stop and sustain ore particles suspended near the surface of said flowing liquid, and also to catch particles dropped from said moving surface toward said liquid.

6. In apparatus of the character described, means for containing a flowing liquid in which ore is suspended with an overflow outlet, a moving surface above liquid, and magnetic means for lifting the ore from said liquid to said moving surface, in combination with a detaining support arranged to intersect the surface of the liquid between the discharge outlet and the moving surface, and adapted to stop and sustain ore particles suspended near the surface of said liquid.

7. In apparatus of the character described, means for containing a flowing liquid in which ore is suspended, a moving surface above said liquid and magnetic means for

lifting the ore from said liquid to said moving surface, in combination with a detaining support extending only partially into the suspension liquid to stop and sustain ore particles suspended near the surface of said liquid and also to catch particles dropped from said moving surface.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses.

GUSTAF EMIL ÖHRN.

Witnesses:
EDITH D. WRIGHT,
ARCHIE H. STRONG.