No. 812,173. PATENTED FEB. 6, 1906.

G. GRÖNDAL.

MAGNETIC ORE SEPARATOR.

APPLICATION FILED APR. 7, 1905.

Fig. 1.

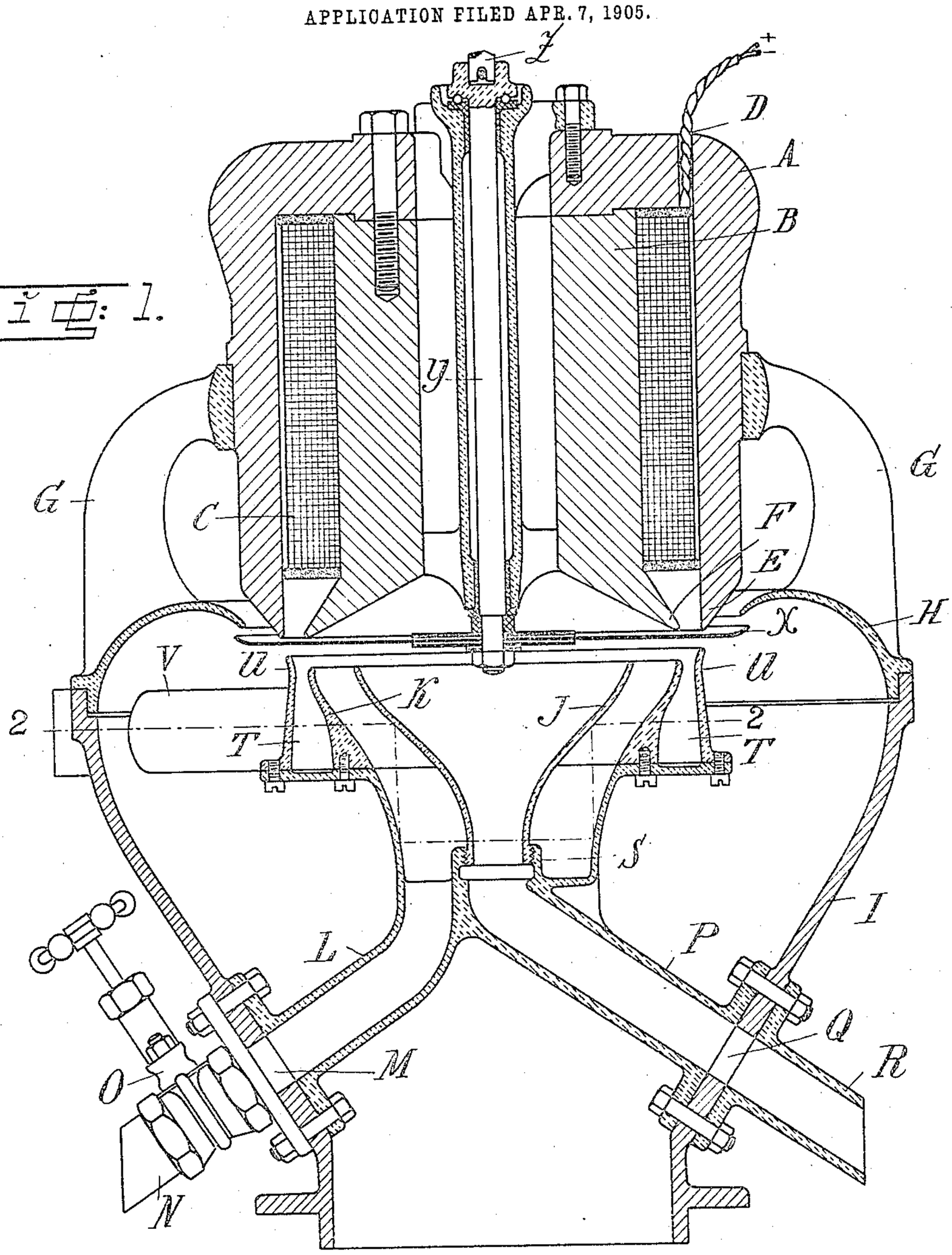
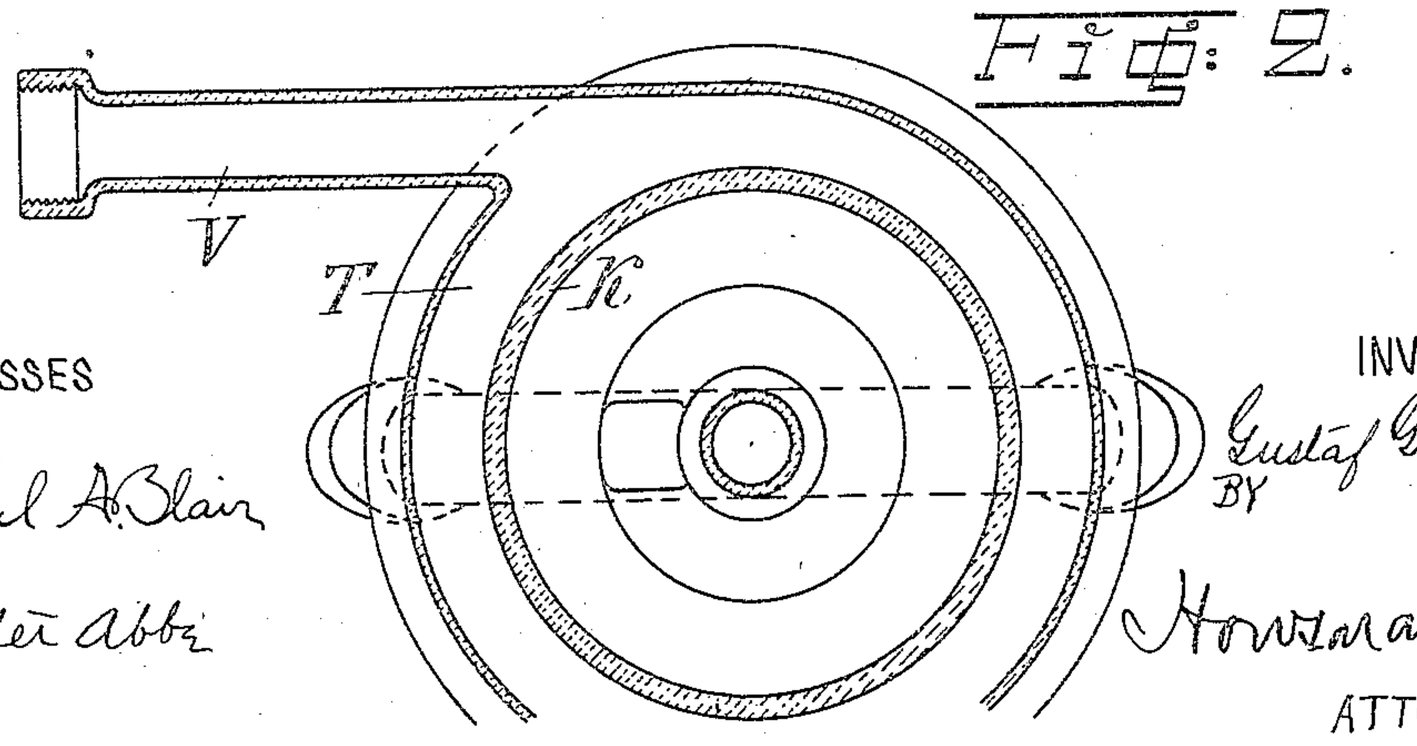


Fig. 2.



WITNESSES

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GUSTAF GRÖNDAL, OF DJURSHOLM, SWEDEN.

MAGNETIC ORE-SEPARATOR.

No. 812,173. Specification of Letters Patent. Patented Feb. 6, 1906.

Original application filed November 3, 1904, Serial No. 231,238. Divided and this application filed April 7, 1905. Serial No. 254,298.

To all whom it may concern:

Be it known that I, GUSTAF GRÖNDAL, a subject of the King of Sweden and Norway, and a resident of Djursholm, Sweden, have invented a new and useful Improved Magnetic Ore-Separator, of which the following is a specification.

The present invention refers to a magnetic ore-separator of the kind in which powdered ore suitable for magnetic separation, particularly magnetic iron ore suspended in water, is led horizontally past the pole-piece of an electromagnet of such a power that it will pull the pure ore particles out of the stream of water, while the less pure particles gather close beneath the surface of the water and are carried away alone separately from the dead-powder, which sinks down and is allowed to flow away.

My present invention is an improvement on the apparatus forming the subject of my application for patent, Serial No. 180,904, filed November 12, 1903, and, like that apparatus, is adapted for carrying out the process forming the subject of my application for patent, Serial No. 235,394, filed December 3, 1904.

On the accompanying drawings there is shown a form of apparatus as an example.

Figure 1 represents a vertical longitudinal section of the apparatus, and Fig. 2 represents a part of the apparatus in a section on line 2 2 of Fig. 1.

The apparatus consists of a cylindrical electromagnet having double walls A and B, connected with each other at the top, and the winding C, arranged between the walls. The conducting-wires enter and issue at D. The walls A and B extend downward beyond the winding C and end in tapering edges which form two concentric pole-pieces E F. The electromagnet is supported on arms G, projecting from a vaulted cover H, resting on the hollow frame I, which is funnel-shaped at the top. In the funnel-shaped portion of the frame there are two funnel-shaped vessels J K, fixed to the frame and arranged concentrically one within the other. The outer vessel K communicates, by means of a hollow arm L and a hole M in the wall of the frame, with a pipe N, provided with a regulating-cock O outside the frame. The inner vessel J communicates, by means of a hollow arm P and a hole Q in the wall of the frame, with a discharge-tube R and is adjustably screwed into the inner upward-directed mouth S of the hollow arm P. Round the vessel K there is a trough-shaped chamber T. The outer wall U of said chamber is higher than the outer wall of the vessel K. With the chamber T there is connected a supply-pipe V.

Beneath the pole-pieces E and F there is a disk X, fixed to a vertical shaft Y, mounted in bearings inside the cylindrical electromagnet, a sufficiently-rapid rotation being imparted to the shaft by any suitable means. Z indicates the lower end of a driving-shaft.

The operation of the apparatus is as follows: After closing the valve O the water, with the suspended ore powder, is led in through the tube V into the chamber T, and after having risen to the brim of the funnel K it flows into said funnel. After the funnel K has been filled the stream passes to the funnel J and from it out through the conduit P R. The electromagnet is now excited and the disk X is caused to rotate. By regulating the supply through the tube V and the position of the valve O the suitable speed of the stream of suspended material flowing over the brim of the funnel K may be obtained so that the magnet has time to pull away the most magnetic particles and to cause the less magnetic particles to follow the stream into the funnel J to be discharged through the conduit P R to be further enriched and giving the dead particles time to sink down in the funnel K, from which they flow off through the conduit L N. The particles that are pulled out of the water and against the rapidly-rotating disk X are immediately flung away toward the sides against the vault H and fall down in the interior of the frame I, from the lower part of which they are removed. By lifting or lowering the funnel J the depth of the stream of suspended material flowing over the edge may be regulated.

It is not necessary that the vessels beneath the magnet should be funnel-shaped. They may have any other suitable form, if desired.

I claim—

1. A magnetic separator for powdered ore suspended in water, comprising an upright cylindrical electromagnet having its pole-pieces directed downward in the shape of concentric rings, beneath said pole-pieces a rapidly-rotating disk mounted on a vertical shaft and beneath said disk two annular ves-

sels concentric to each other, an inlet for the fluid to the outer vessel and an adjustable discharge at the bottom of the inner vessel, the space inside said inner annular vessel being provided with an outlet for the fluid.

2. A magnetic separator for powdered ore suspended in water, comprising an upright cylindrical electromagnet having its pole-pieces directed downward in the shape of concentric rings, beneath said pole-pieces a rapidly-rotating disk mounted on a vertical shaft and beneath said disk two annular vessels concentric to each other, an inlet for the fluid to the outer vessel and an adjustable discharge at the bottom of the inner vessel, the space inside said inner annular vessel being provided with an outlet for the fluid, and a collecting vessel surrounding the circumference of the disk.

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

GUSTAF GRÖNDAL.

Witnesses:

FREDRIK L. ENQUIST,

A. HELJESTRAND.