

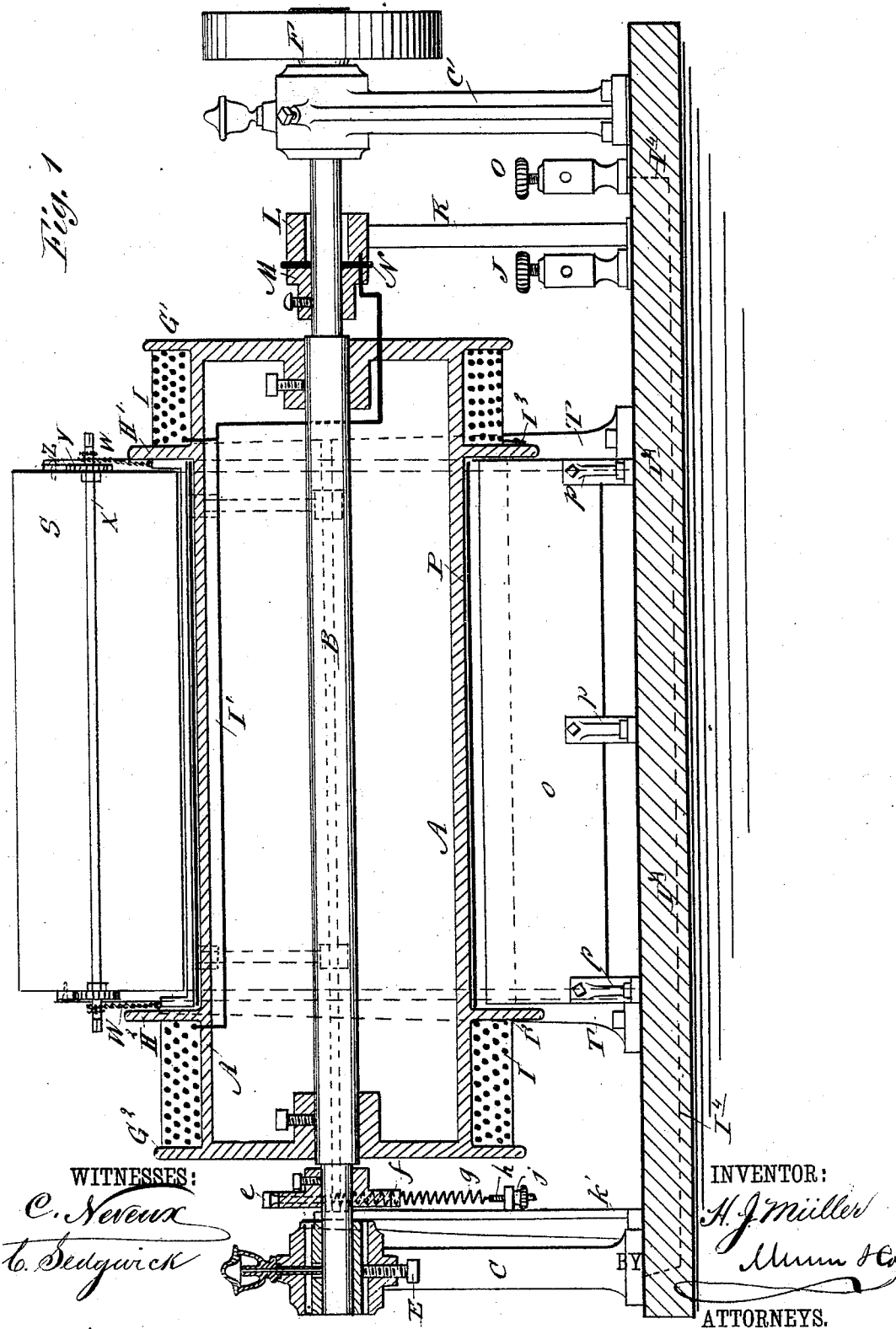
(No Model.)

2 Sheets—Sheet 1.

H. J. MÜLLER.
MAGNETIC ORE SEPARATOR.

No. 249,388.

Patented Nov. 8, 1881.



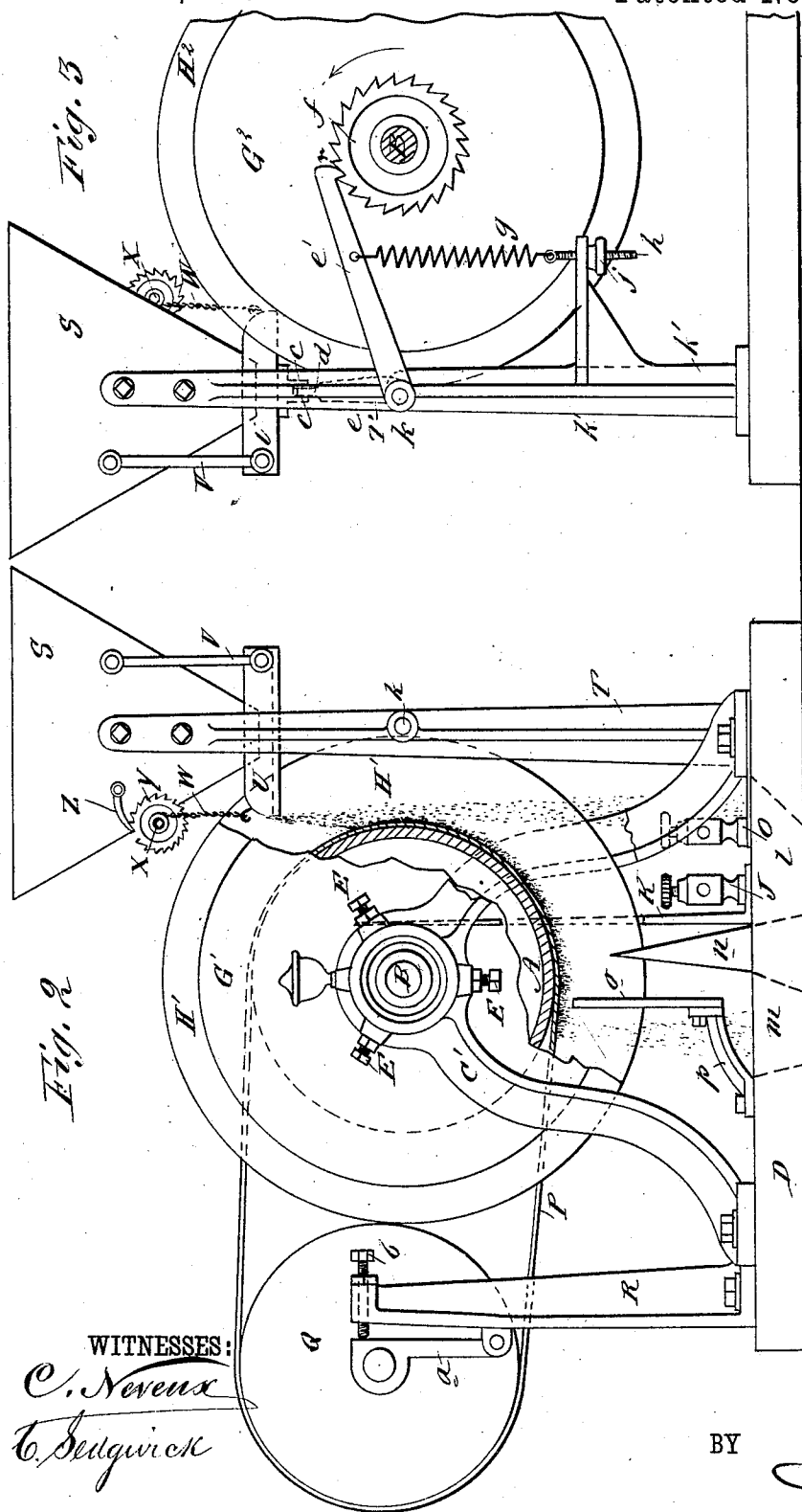
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WITNESSES:

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INVENTOR:

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BY

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UNITED STATES PATENT OFFICE.

HANS J. MÜLLER, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF AND
ALEXANDER LEVETT, OF SAME PLACE.

MAGNETIC ORE-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 249,388, dated November 8, 1881.

Application filed April 11, 1881. (No model.)

To all whom it may concern:

Be it known that I, HANS J. MÜLLER, of the city, county, and State of New York, have invented a new and Improved Magnetic Ore-Separator, of which the following is a specification.

The object of my invention is to provide a new and improved device for separating particles of iron, steel, &c., from granulated or pulverized ore or other material.

The invention consists in a revolving cylindrical electro-magnet, around which a band or belt passes, also passing around a cylinder or roller parallel with the magnetic cylinder, in combination with a vibrating feeding device, from which the granulated or pulverized material drops tangentially to the magnetic cylinder, so that the particles of steel or iron will be attracted by the magnetic cylinder and will be carried off by the belt until the same leaves the magnetic cylinder, when these particles of iron or steel will drop into a suitable chute or receptacle separated from the receptacle or chute into which the ore drops by a beveled longitudinal partition. A magnetic plate extends longitudinally along the magnetic cylinder, below the same, and over the chute into which the particles of iron drop, for the purpose of preventing the swinging clusters of particles of iron or steel which are formed on the belt from dropping into the chute or receptacle for the ore.

The invention further consists in so constructing the magnetic cylinder that it has double poles—that is to say, two opposing poles in the middle of its length, besides those at the ends.

In the accompanying drawings, Figure 1 is a longitudinal sectional elevation of my improved ore-separator. Fig. 2 is an end elevation of the same, partly in section. Fig. 3 is a side elevation of the vibrating feeding device.

A solid or hollow cylinder, A, of steel or iron, is rigidly mounted on a shaft, B, journaled in the end uprights, O C', resting on a base-plate, D. One of the uprights is provided with the set-screws E E E for adjusting the bearing of the shaft B. A driving-pulley, F, is rigidly mounted on one end of the shaft; or the shaft may be provided with other suitable devices

for rotating it. The cylinder A has radial annular flanges G' G² at each end, and parallel annular flanges H' H² located a short distance inward from them. The wires of the electro-magnets are wound around the cylinder, between the flanges G' H' G² H², whereby a double pole is formed between the coils. It is obvious that by such double pole the attractive power of the cylinder is doubled, so that it will support twice, or nearly twice, the quantity of ore which would be upheld by a single-pole cylinder. The wire from the electric generator is held by a binding-screw, J, which is connected with a spring strip of metal, K, extending up to and resting against a metal ring, L, surrounding but not touching the shaft B. A like ring, M, is mounted on the shaft B adjoining the ring L, and a layer of insulating material, N, is interposed between these two rings, the ring L being attached to the ring M by any suitable means—such, for instance, as a wooden bar or clamp extending across from one to the other. The end of the wire I' passes from the ring L through the insulating material N and the ring M and into the cylinder, and is connected with the inner end of the wire I, between the rings G' H' and G² H², as shown in Fig. 1. The current will thus pass from the binding-screw J through the spring brush-strip K, the rings L and M, the wire I' I, and from the outer ends of the wire I, through the cylinder A, to the shaft B, and through standards C, along wire I', to the return-wire binding-screw O.

A belt or band, P, of brass, iron, steel, or other suitable material, passes around the cylinder A, between the rings H' H², and around a cylinder or roller, Q, journaled parallel with the cylinder A in the uprights R, resting on the base-plate D. The bearings of the cylinder Q are in the upper ends of swinging arms a, pivoted to the uprights R, and these arms a can be adjusted by set-screws b, whereby the tension of the belt P can be regulated.

A hopper, S, is held parallel with the cylinder A by the two uprights T T, and a longitudinal plate or shelf, U, is pivoted to the connecting-rods V, pivoted to the end of the hopper. The end of the shelf U toward the cylinder A is supported by cords W, wound on

shafts X, provided with ratchet-wheels Y, engaging with a pawl, Z, pivoted to the end of the hopper. The front end of the shelf U can thus be adjusted higher or lower by means of the cords and ratchet-wheels, and the quantity of pulverized material dropping from the edge of the shelf can thus be regulated. Two jaws, *c c*, or a recessed plate, are attached to the under side of the shelf U, and the end *d* of an arm, *e*, of a shaft, *k*, journaled in the standards T, passes in between the jaws *c c*, and the arm *e'*, (of the shaft *k*), provided with a tooth, *r*, is held against a ratchet-wheel, *f*, by a spring, *g*, provided with a threaded stem, *h*, on which an adjusting-nut, *j*, is mounted. The inner edge of the shelf U must be almost vertically above the adjoining edge of the cylinder A, as shown in Fig. 2.

The base-plate D is provided with a longitudinal slot, *l*, with beveled sides under the edge of the shelf U, and said base-plate is also provided with a like longitudinal slot, *m*, in the opposite side, these two slots being separated by a longitudinal beveled partition, *n*, extending upward within the outer edge of the rings H' H². A vertically-adjustable magnetic steel plate, *o*, is held vertically above the slot *m* by a series of arms, *p*, this plate extending upward to within a short distance of the cylinder A. The upper edge of this plate *o* is directly below the line of the cylinder A on which the belt P leaves the cylinder A.

For very finely divided particles the belt P is to be made of thin sheet-brass; but for coarser particles it is to be made of steel or iron sheets.

The operation is as follows: The pulverized or granulated ore or other material from which the particles of iron or steel, &c., are to be separated is placed into the hopper S and the cylinder is rotated. The action of the ratchet-wheel *f* on the tooth *r* of the arm *e'* causes a vibration of this arm, and as the end *d* of the arm *e* is held between the jaws *c c* on the under side of the shelf U this shelf will be vibrated in a horizontal plane, and the non-metallic portion of the pulverized ore, or rather the portion which has no or a very slight capacity for magnetic attraction, will drop from the inner edge of the same into or through the slot *l*. As the material passes the cylinder A the particles of iron, steel, &c., will be attracted by the magnetic cylinder, and will cling to the belt P, and will be carried around by the same until it leaves the cylinder, which takes place directly above the slot *m*, when the particles of iron or steel will drop into or through the slot *m* and into a suitable receptacle. The ore leaves the belt at this point, because the magnetic attraction there becomes insufficient to hold it—i. e., to support its weight. In case the pulverized ore contains very large quantities of iron or steel, long clusters of particles

of iron or steel will be formed at the lower part of the cylinder, and as these clusters receive a swinging motion from the movements of the belt P it frequently happens that parts of these clusters tend to drop into the slot *l* instead of dropping into the slot *m*. To avoid this I have provided the plate *o*, for the cylinder A is positive, and the upper end of the plate *o* is negative and the lower end positive, upon the principle of induction—that is to say, the effect of an electrified body which tends to produce an opposite electrical state in surrounding and contiguous bodies. As the lower ends of these clusters are positive (the same as the cylinder A) they will all be attracted by the negative upper end of the plate *o*, and the swinging movement of these clusters will cease. I have described this plate *o* as being made of steel, and I prefer to do so; but it may be made of iron, as the poles of the same will be maintained by the cylinder A, which is very close to it.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In an ore-separator, the combination of a revolving magnetic cylinder, a roller, a steel band which runs thereon, and a feeder for delivering the granulated ore in contact with the band, to which it adheres, and is thus carried beneath the cylinder, as described.

2. In an ore-separator, the combination, with the magnetic cylinder A, the steel band P, and the cylinder Q, of the bed-plate provided with the slots *m* and *l*, and the longitudinal partition *n*, parallel with the cylinder A, substantially as herein shown and described, and for the purpose set forth.

3. In an ore-separator, the combination, with the magnetic cylinder A, the belt P, and the cylinder Q, of bed-plate provided with the slots *m* and *l*, the partition *n* separating them, and the magnetic plate *o*, substantially as herein shown and described, and for the purpose set forth.

4. In an ore-separator, the combination, with the cylinder A, the electro-magnet wires I, the ring M on the shaft B, the insulated ring L on the shaft B, the metal strip K, and the binding-screw J, substantially as herein shown and described, and for the purpose of conducting the current to the wires of the electro-magnet, as set forth.

5. The electro-magnetic cylinder formed of the flanged metal cylinder proper, having a coil of wire around each end, as shown and described, for the purpose specified.

HANS J. MÜLLER.

Witnesses:

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