

(No Model.)

2 Sheets—Sheet 1.

M. H. SMITH.
MAGNETIC SEPARATOR.

No. 383,918.

Patented June 5, 1888.

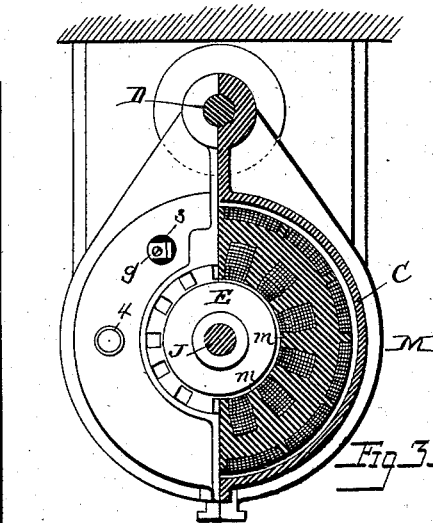
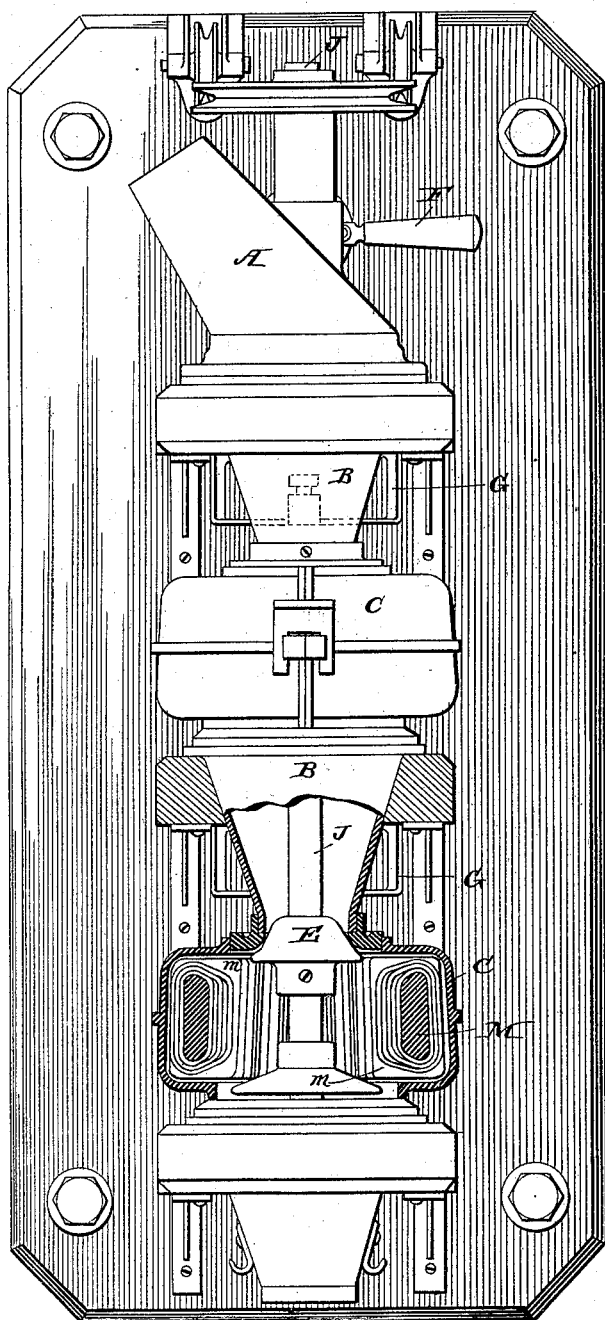


Fig. 1.

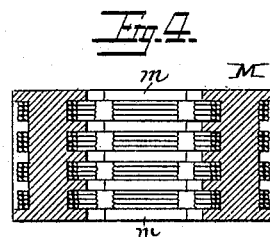


Fig. 4.

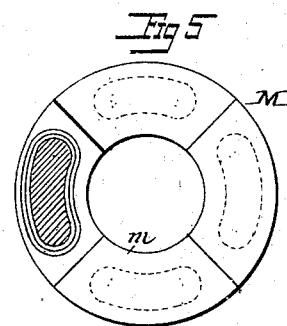


Fig. 5.

Witnesses.

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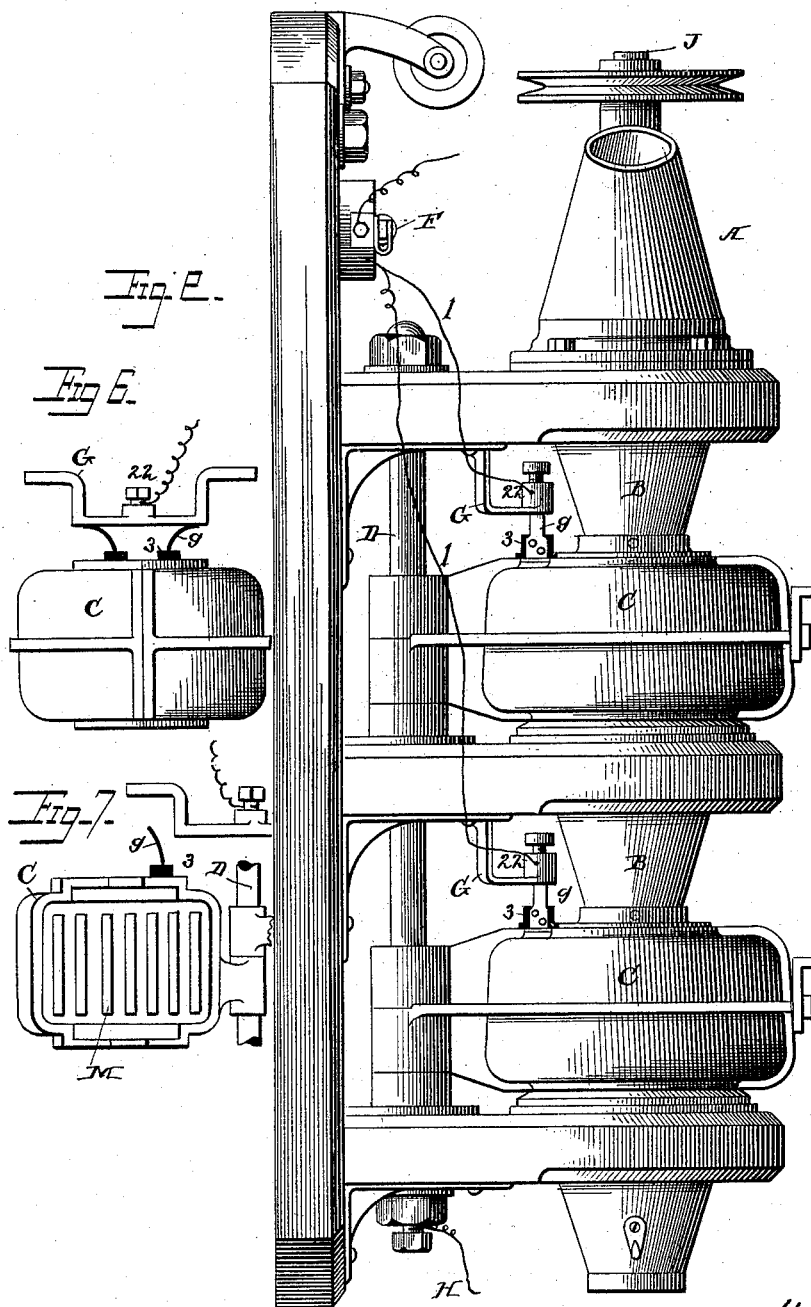
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2 Sheets—Sheet 2.

M. H. SMITH.
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Witnesses:
Jno. G. Hinkel, Jr.
Sidney Johnson.

M. Holroyd Smith,
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By Foster & Freeman

Attorneys.

UNITED STATES PATENT OFFICE.

MICHAEL HOLROYD SMITH, OF HALIFAX, COUNTY OF YORK, ENGLAND.

MAGNETIC SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 383,918, dated June 5, 1888.

Application filed October 29, 1887. Serial No. 253,766. (No model.) Patented in England August 9, 1887, No. 10,893.

To all whom it may concern:

Be it known that I, MICHAEL HOLROYD SMITH, a subject of the Queen of Great Britain, and a resident of Halifax, in the county of York, England, have invented certain new and useful Improvements in Magnetic Separators, (for which application for patent has been filed in Great Britain August 9, 1887, No. 10,893,) of which the following is a specification.

The object of this invention is the separation of iron and such metals as are susceptible to magnetic action from other substances. I am aware that numerous devices have been patented for this purpose, but as far as I know none are efficient for the removal of pulverized iron from other pulverized material when reduced to an impalpable powder, and my invention has special reference to the treatment of material in this condition. For this purpose I cause the material to be treated to enter a conical hopper or funnel through which passes a vertical spindle revolving at a high velocity and fitted with adjustable cones or disks partially closing the neck of the hopper. These cones are surrounded by a magnetic ring having a number of alternate poles, against which the material falling from the hopper is thrown by the centrifugal action of the revolving cones, and the poles of the magnetic ring attract and hold the iron while the other material falls into a second hopper and either passes into a sack or other receptacle, or if the one magnetic ring has not sufficiently extracted the iron, a succession of such cones and rings may be placed one under the other. To facilitate the clearing of these rings they are in two halves held in cases which hinge upon a vertical rod parallel with the spindle. The cases are provided with brushes or springs which make contact, when the case is closed, with terminals of wires from a dynamo or battery supplying the electric current to magnetize the ring, and when the case is open breaking contact with said terminals, demagnetizing the ring, and allowing the iron to fall.

In the accompanying drawings, Figure 1 is a front view, partly in section, of a separator embodying my invention. Fig. 2 is a side view of the same. Fig. 3 is a plan view, partly in section, showing one of the magnetic rings of the separator. Figs. 4 and 5

are views of a modified form of the ring, and Figs. 6 and 7 are details.

In the drawings, A represents the supply-pipe. B is the hopper or funnel connected therewith and leading to the case C containing the dividing or sectional electro-magnets. These cases are supported upon and preferably hinged on a rod, D, and are made in two parts, so that they may be readily opened to remove the magnetic material which has been separated from the other material and which clings to the pole-pieces of the magnet. The parts of the case may be fastened together by any suitable means when the machine is in operation.

E E represent revolving cones which are adjustably mounted upon a spindle, J, passing through the case and supported in suitable bearings, as shown. These cones are made adjustable so as to regulate the flow of material from the hoppers B against the magnetic ring hereinafter described, and I preferably arrange these cones so that the material will be thrown outward in a sheet or veil, so that all the particles may be brought into close contact with the magnetic poles.

Another advantage of the revolving cones consists in the fact that iron being of greater specific gravity than flint or other material, the centrifugal force causes the iron to be thrown against the poles of the incasing magnetic ring.

Secured in the case C by suitable bolts or other means is an iron ring, M, having recesses cut therein, in which coils of insulated wire are so wound as to make the intervening projections, *m*, of alternate polarity. The magnetic coils are excited by an external generator—either dynamo or battery—and the current is brought by means of the switch F and wires 1, leading to the terminals 2, attached to a bracket or fender, G, with which contact is made by springs *g*, attached to insulated studs 3, secured to the casing C, these springs having attached to them the wires from the magnet M. The farther end of the magnetic-coil wires is attached direct to the casing C by a stud, 4. These lead the current, by means of the casing C, to the rod D, from the extremity of which, H, the wire returns to the excited generator.

In the accompanying drawings I have shown

one separator consisting of the magnetic rings through which the material passes successively, and it will be understood that in practice I may use one or more magnetic rings arranged in succession, according to the nature of the material to be separated. It will also be understood that I may arrange a number of separators in duplicate or in clusters and feed them from a general supply.

While I have shown in the accompanying drawings the rings having tapering projections, I do not wish to confine myself to this specific form, as it is evident to those skilled in the art that the projections may be of many and various shapes, as may seem best adapted to the particular purpose for which they are used. I have found it advantageous in practice to make these poles serrated in order to give a number of magnetic edges to which the particles to be attracted adhere.

While I have described one practical form of embodying my invention, and a form which I have found to be eminently successful in practice, I do not wish to limit myself to the special construction shown and described, as it is evident that my invention may be embodied in other devices without departing from the principles thereof. For instance, the poles of the magnets may form a series of horizontal rings, as illustrated in Figs. 4 and 5.

What I claim is—

1. In a magnetic separator, the combination of a magnetic ring, and a rotating cone whereby the material to be separated is distributed by centrifugal force against the surface of the ring, substantially as described.

2. In a magnetic separator, the combination of a magnetic ring having internal projections

of opposite polarity, and a rotating cone arranged to distribute the material to be separated by centrifugal force against the magnetic projections of the ring, substantially as described.

3. In a magnetic separator, the combination of a stationary magnetic ring, and an inclosing case for said ring, said case being formed in two parts, whereby the case may be easily opened, as and for the purpose set forth.

4. In a magnetic separator, the combination of a stationary magnetic ring, a case inclosing the same, a conical hopper leading to the case, a shaft, and a rotating cone adjustably mounted on said shaft, substantially as described.

5. In a magnetic separator, the combination of a magnetic ring made in two parts, each part secured in one portion of a separable case, whereby the case may be opened to expose the internal projections on the ring, substantially as described.

6. In a magnetic separator, the combination of a case made in two parts, each part inclosing one portion of a magnetic ring, electrical connections for said ring, consisting in part of a spring adapted to bear upon a bracket, the arrangement being such that when the case is open the electric circuit is broken, and when the case is closed the circuit is established by the spring, substantially as described.

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

M. HOLROYD SMITH.

Witnesses:

F. L. FREEMAN,
J. S. BARKER.