No. 676,618. Patented June 18, 1901.

T. A. EDISON.

MAGNETIC SEPARATOR.

(Application filed July 16, 1897.)

(No Model.)

Fig. 1.

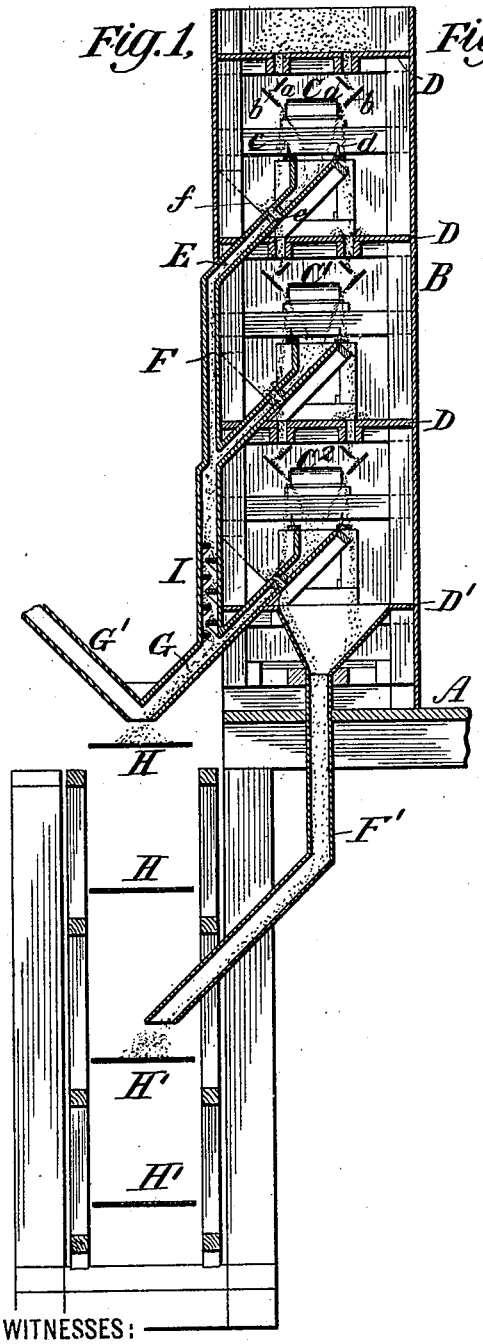


Fig. 2.

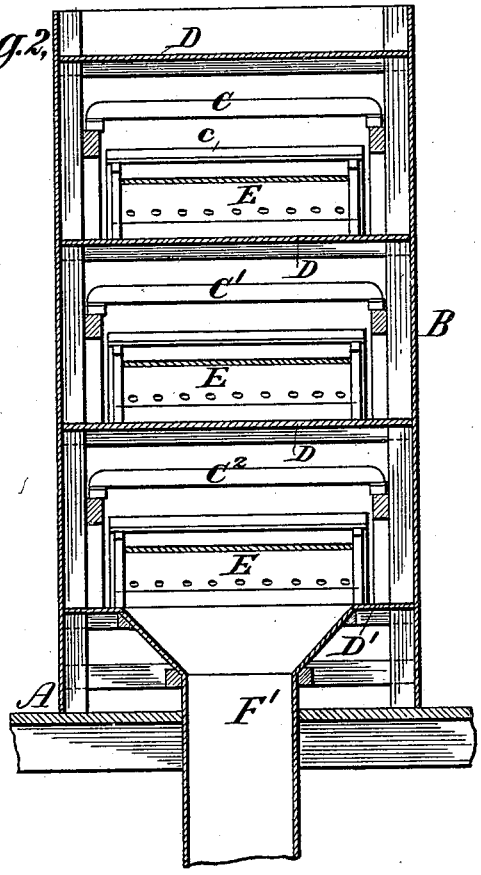
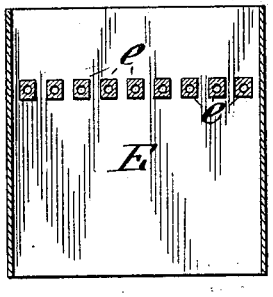


Fig. 3.



WITNESSES:

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THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY.

MAGNETIC SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 676,618, dated June 18, 1901.

Application filed July 16, 1897. Serial No. 644,744. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Magnetic Separators, (Case No. 974,) of which the following is a specification.

In the concentration of pulverized magnetic iron ore I have found that in order to recover not only the pure magnetic particles, but also the particles which are partly magnetic and partly non-magnetic, without carrying over an undue amount of gangue or non-magnetic material it becomes desirable to subject the material several times successively to the action of a magnetic separator.

The object of my present invention is to accomplish this in a simple and effective manner.

In the accompanying drawings, forming a part hereof, Figure 1 is a vertical section of an apparatus embodying my invention. Fig. 2 is a section at right angles to Fig. 1, and Fig. 3 is a section lengthwise through one of the inclined conducting-passages.

A represents the main flooring or supporting-beams. Upon this is erected a vertical framework B, having boarded sides and constituting a stack. Within the stack and in the same vertical line are located a number of bar-electromagnets C C′ C². Three of such magnets are shown, but a greater number may be employed. The magnets are of the construction described in an application for patent filed June 12, 1897, (Case No. 973.) They are bar-magnets which are wound lengthwise of the bars and are arranged in a horizontal position, the side edges of the bars being the polar faces. Two streams of material are fed directly against the opposite polar faces of each magnet by means of checking and spreading boards *a b*. The stack B has a floor D above each magnet, and two slots in each of these floors deliver the material to the magnet directly below, a roller-feed (not shown) being preferably employed at each slot. The dividing-boards *c d* receive between them the magnetic material which is withdrawn from the falling stream by the two poles of the magnet. The space between the dividing-boards forms a hopper for receiving the magnetic material, which hopper is connected by an inclined, wide, and flat conduit E with a vertical conduit F, which terminates at its bottom in an inclined pipe G, delivering the concentrate upon a conveying-belt H.

G′ illustrates a pipe similar to G, delivering the concentrate from an adjoining stack of separators. Near the bottom of the vertical conduit F are a series of baffle-plates I. These are horizontal shelves introduced into the conduit and placed alternately on opposite sides of the conduit, so that the falling material is forced to take a zigzag course, and its falling movement is arrested, so that it will be delivered to the conveying-belt with a minimum speed.

The material which is rejected by the magnet C and which falls outside of the dividing-board *d*—*i. e.*, the tailings—is received directly by the floor D beneath the magnet C, from which it is delivered by a slot to one polar face of the magnet C′; but the material rejected by the other pole of the magnet C and which falls outside of the dividing-board *c* falls on top of the inclined conduit E, through which the concentrate passes. To enable this material to pass through and reach the flooring D, from which it is delivered to the next magnet, a number of plugs *e* are located at the proper point in the inclined conduit E, and perforations are formed through the sides of the inclined conduit and through these plugs, so as to allow the pulverized material which falls on top of the inclined conduit to pass through to its under side and to distribute across the flooring D beneath, so as to deliver it evenly to the magnet below. An inclined board *f* may be used to confine the material which falls on top of the conduit E to a space in the neighborhood of the perforated plugs *e;* but this board may be omitted and the material allowed to accumulate until it forms itself an inclined bottom, from which the material will flow through the perforated plugs *e*.

The arrangement of the parts just described is repeated in connection with each magnet except that below the lowermost magnet the flooring D′ opens into a hopper which is connected with a conduit F′, leading

to a second conveying-belt H′, which carries off the non-magnetic material to the dump.

Baffle-plates similar to those in the conduit F may be placed in the conduit F′ if the length of this conduit is sufficiently great to require the arrest of the motion of the material. The magnets C, C′, and C^2 may be of the same strength; but I prefer to make them of progressively greater strength. This result is produced, preferably, by increasing the ampere-turns upon the magnets progressively, which may be accomplished by making the windings different or by applying different electromotive forces to the same windings. By making the magnets of progressively greater strength the work is better divided between the several magnets and less of the non-magnetic material is carried over with the magnetic material, which would result to a larger extent if it were attempted to withdraw all the magnetic as well as partly-magnetic particles by one magnet. The lowermost of the several magnets is made of such strength that any particle which has even a small percentage of magnetic material is separated from the wholly-non-magnetic particles. By arranging the magnets in a stack one above the other a single elevation of the material is only required, the several operations of separation being performed without moving the parts.

What I claim is—

1. In a magnetic separator, the combination with a series of bar-magnets arranged in a stack and feeding devices for feeding the material by gravity directly against both polar faces of the magnets in succession, of the floors for receiving the material rejected by one magnet and for delivering it to the magnet next below, and the inclined conduits for carrying off the concentrate from the several magnets and provided with lateral passages to permit the rejected material or tailings which fall on top of the conduit to pass through the receiving-floor beneath it, substantially as set forth.

2. In a magnetic separator, the combination with the stack B, of the magnets C, C′, C^2 of different strengths, the perforated floors D, inclined boards *a*, *b*, dividing-boards *c*, *d*, and inclined conduits E provided with perforated plugs *e*, substantially as set forth.

This specification signed and witnessed this 14th day of May, 1897.

THOMAS A. EDISON.

Witnesses:
JNO. R. TAYLOR,
EUGENE COURAN.