J. Y. SMITH.

Separating Magnetic Ores.

No. 109,354. Patented Nov. 15, 1870.

Fig. 1.

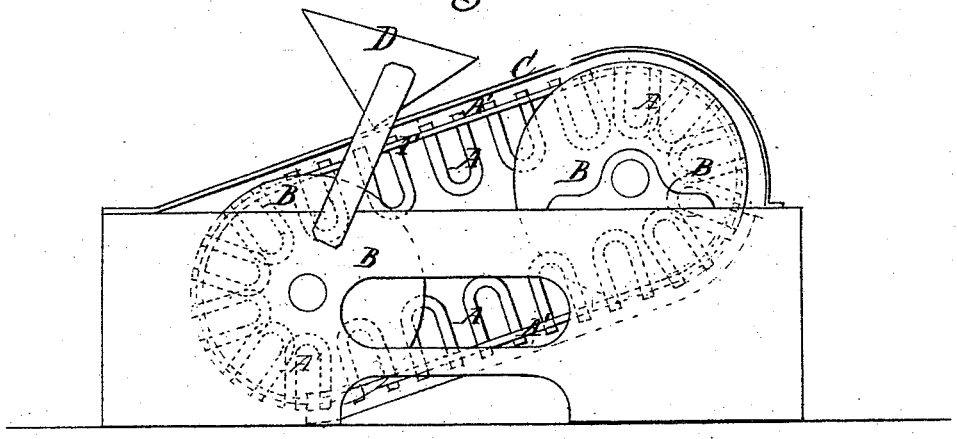


Fig. 2.

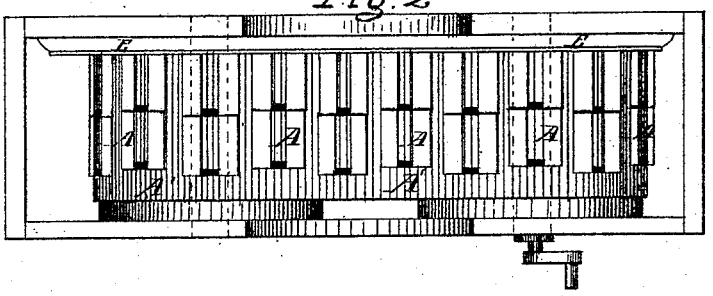
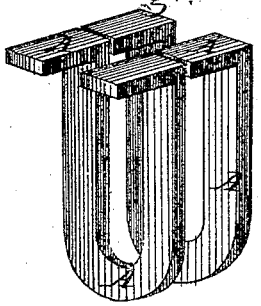


Fig. 3.



Attest
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UNITED STATES PATENT OFFICE.

JOHN Y. SMITH, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN MACHINES FOR SEPARATING MAGNETIC-IRON ORES FROM OTHER SUBSTANCES.

Specification forming part of Letters Patent No. **109,354**, dated November 15, 1870.

To all whom it may concern:

Be it known that I, JOHN Y. SMITH, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain Improvements in Machines for Separating Magnetic-Iron Ores or Particles of Iron from Other Substances; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawing making part of this specification, in which—

Figure 1 is a side elevation.

Figure 2 is a bottom view.

Figure 3 is a perspective view of the magnets as arranged.

The same letters are used in all the figures to designate identical parts.

My improvements relate to machines in which magnets are used for separating particles of iron or magnetic-iron ore from other substances not magnetic.

My machine may be used for separating magnetic particles from ores, mill-sweepings, clay, or other combinations in which they may be found and from which it is desirable to remove them.

In the annexed drawing—

A A are magnets, which may be either U-magnets, permanent or electro-magnetic, or straight bars magnetic, having their ends with a different polarity. These magnets I prefer to form and arrange across the belt, substantially as shown in fig. 3, to present a greater surface for action on the ore or other particles subject to magnetic action.

These magnets are placed in an endless belt, A′, carried around two drums, B B, so that their points shall project to the outside of the belt, and they are so arranged that, as they stand on the endless belt, they shall, with the revolution of the belt and magnets carried by it, present alternately, as they pass, a north and a south pole to the ore or other magnetic particles to be carried on the metallic apron or incline C.

This apron or incline may be constructed of brass, zinc, or other metal or material which will transmit the magnetic force through it, but without becoming itself magnetic. It should be arranged, substantially as shown, above the magnets, and to avoid friction and consequent wear I prefer that the apron shall not touch the points of the magnets.

The hopper D is arranged to discharge the ore or other material upon the apron C, substantially as shown.

The portion of the apron C which is above the magnets should be roughened or covered by a woven fabric, to prevent the ore slipping on its surface, as it would do if the surface was polished.

The ore or other substance containing particles of iron or magnetic-iron ore should be powdered or reduced to a granular form.

The operation of the machine will be as follows:

When the pulverulent material containing the particles of iron or magnetic-iron ore falls upon the apron C from the hopper, the particles acted upon by magnetic influence will stand up on the apron C in position perpendicular to the face of the magnets, and the upper and lower ends of the particles will have different polarity, according to the polarity of the magnet immediately below them.

As a magnet of different polarity approaches with the revolution of the endless belt A′ carried by the drums B B, (revolved by any convenient power,) the magnetic force of the magnet or arm of a magnet, coming into action, will act upon the magnetized particle, and cause it to fall toward such magnet, and, when the magnet passes under it, reassume a vertical position, with a reversed polarity.

In revolving the particle will move toward the approaching magnet, and as the magnets or arms of magnets thus successively approach and pass under the particles they will roll up the incline, and be discharged at one end of the machine, while the non-magnetic particles, not being subject to the action of the magnets, will slide down the incline, and be discharged at the opposite end of the machine.

The apron C may be hinged at the upper end, and be made to operate by a knocker or shaker, to expedite the discharge of the non-magnetic particles.

The ore remaining on the apron C will form a keeper to retain the magnetic strength of the upper magnets when the machine is at rest.

An iron plate, E, attached to the frame, is arranged to touch the points of the magnets in the belt not under the apron, and serve as a keeper, by connecting the poles of the magnets. As the points of the magnets across the belt touch the next in series, it will be suffi-

cient that the keeper E shall touch the points of the outer row.

The arrangement of magnets herein shown on an endless belt carried around two drums, B B, may be adapted to my improved magnetic separator, as heretofore patented, with this advantage, that by extending the surface on which the magnets carry the ore underneath, the work of separation may be more fully performed.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The endless belt of magnets carried upon drums or pulleys, arranged substantially as set forth.

2. In combination with revolving magnets, an apron, C, on which the separation occurs, substantially as set forth.

3. The arrangement of the magnets with reversed poles in succession, substantially as set forth.

4. In combination with magnets arranged substantially as set forth, a keeper, E, attached to the frame, to form a permanent connection between the poles of the magnets not in action on the ore.

5. The apron C, having its upper surface roughened, substantially as set forth.

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

JOHN Y. SMITH.

Witnesses:
R. MASON,
B. EDW. J. EILS.