2 Sheets—Sheet 1.

A. WORK.

MAGNETIC ORE-SEPARATORS.

No. 194,797. Patented Sept. 4, 1877.

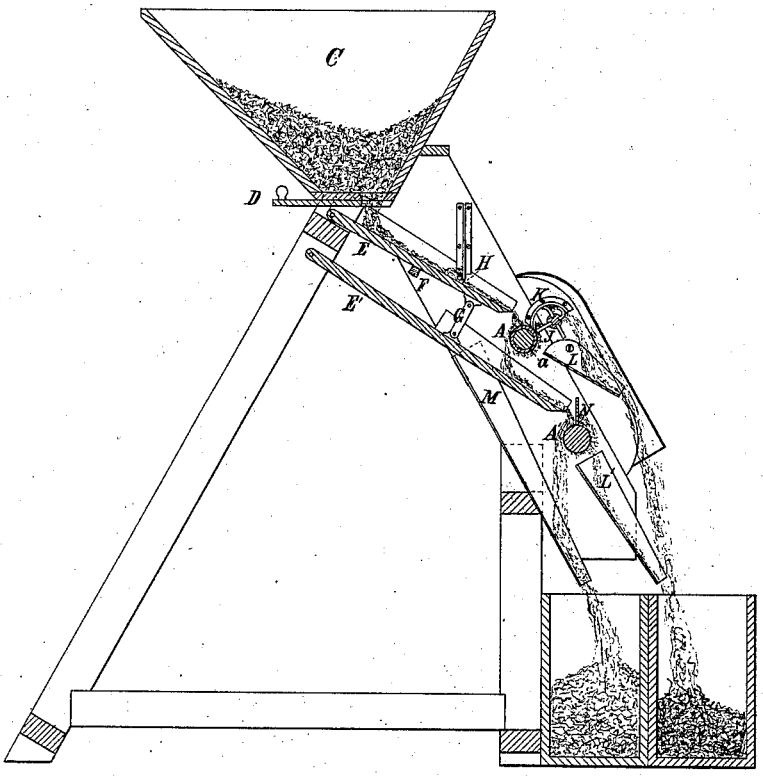

Fig. 1.

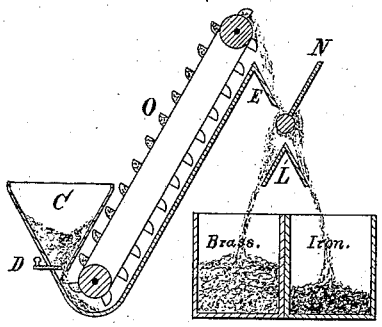

Fig. 2

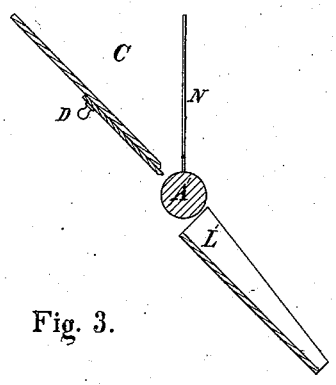

Fig. 3.

WITNESSES.

Saml. G. Colwell.

H. W. Hubbard.

INVENTOR.

Alanson Work.

2 Sheets—Sheet 2

A. WORK.

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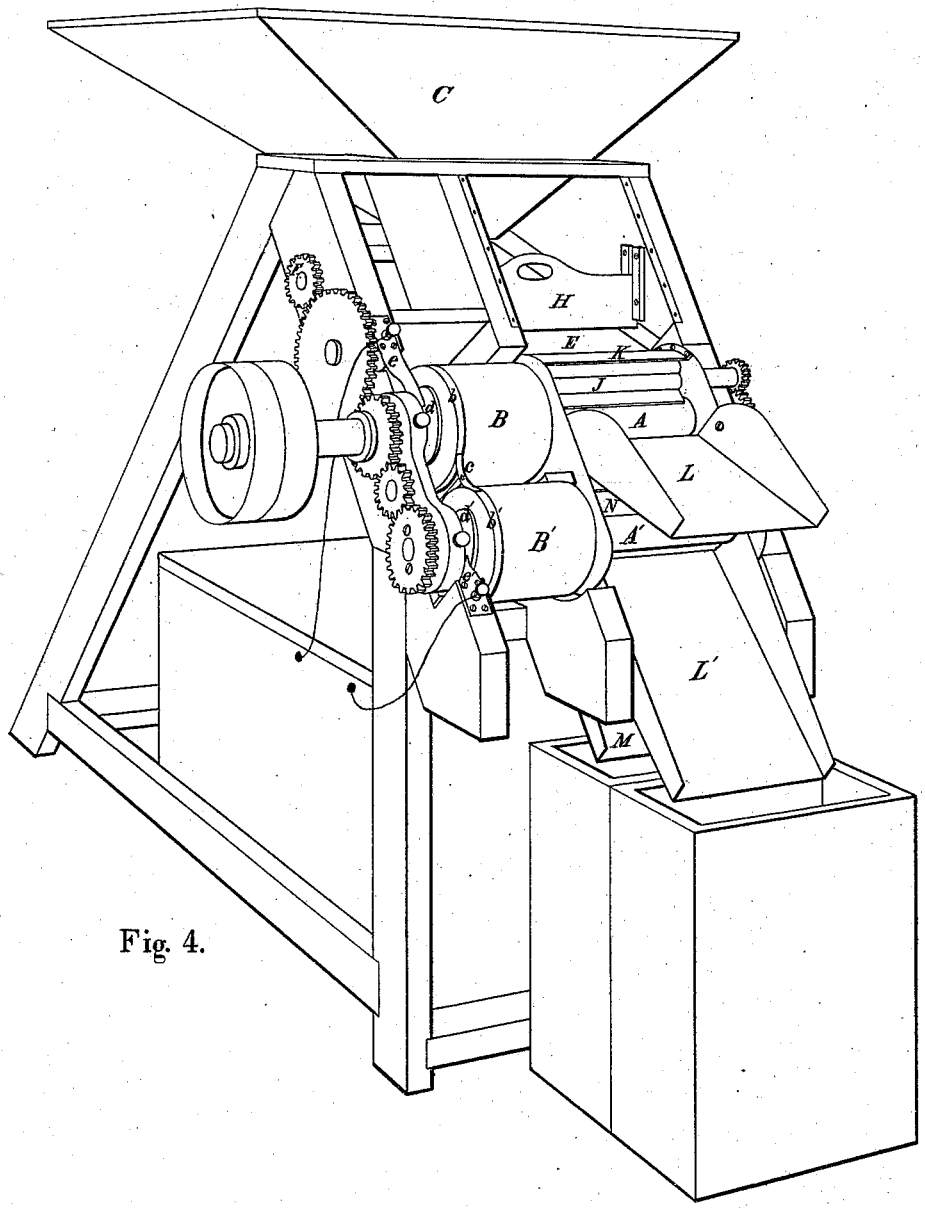

Fig. 4.

WITNESSES.

Sam'l. G. Colwell.

W. W. Hubbard.

INVENTOR.

Alanson Work.

UNITED STATES PATENT OFFICE.

ALANSON WORK, OF PROVIDENCE, RHODE ISLAND.

IMPROVEMENT IN MAGNETIC ORE-SEPARATORS.

Specification forming part of Letters Patent No. **194,797**, dated September 4, 1877; application filed May 3, 1877.

To all whom it may concern:

Be it known that I, ALANSON WORK, of the city and county of Providence, and State of Rhode Island, have invented a new and useful Improvement in Magnetic Separators for separating particles of iron from brass-turnings and filings and other non-magnetic substances; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a vertical section of the machine. Figs. 2 and 3 represent modifications of the feeding arrangement. Fig. 4 is a general view in perspective.

My improvement consists in the employment of a shaft of round iron, supported in proper bearings, and rotated by suitable mechanism, around a portion of which is formed a helix of insulated copper wire revolving therewith, through which a continuous galvanic current is passed, thus charging the shaft with magnetic properties. In connection with this shaft I arrange suitable devices for feeding the mixed particles of brass and iron uniformly, and for removing the magnetic particles which adhere to the roll.

In finishing brass-work the turnings and filings become, in many cases, largely mixed with particles of iron and steel. Even when the utmost care is taken to keep all work in brass and iron separate, the particles of steel worn from the cutting-tool are frequently sufficient to injure the quality of the brass-turnings for remelting.

The almost universal method employed for removing these particles of iron and steel is that of passing a permanent horseshoe-magnet by hand through the particles in small masses, and brushing off those which adhere to the magnet, which operation is repeated until they are considered sufficiently clean. The operation is a slow and tedious one, and the result is generally imperfect, so much so as to forbid the use of such turnings, even after cleaning, where fine castings are required, it having been found impossible to wholly remove the fine iron-filings.

To overcome this difficulty, as well as to greatly increase the rapidity of the operation, is the object of the present invention.

In the accompanying drawings similar letters of reference indicate like parts.

A and A′ are the magnetic rolls. *a* is an iron sleeve fitted over the roll, outside of the helix, to admit of easy replacement when it wears away.

B and B′ are the helices covering a portion of the rolls. *b* and *b′* are insulated brass rings, to which the outer ends of the helical wire are attached. *d* and *d′* are similar rings, to which the inner ends are attached. *c* is a brass spring connecting *b* and *b′*. *d* and *d′* are connected with the galvanic battery through the brass springs *e* and *e′*.

C is the receiving-hopper, provided with a valve, D, to regulate the flow of the discharge.

E and E′ are two inclined aprons, pivoted at their ends, and vibrated by the rotation of the square shaft F, and connected together by the link G.

H is a second gate or valve, to insure the even delivery of the particles to the roll.

J is a wiper, with elastic wings, rotating preferably in the opposite direction from the roll A, and at a higher rate of speed. By lowering the chute to the position shown at L′ the wiper may be rotated in the opposite direction with good effect.

K is a guard, made from non-magnetic metal, resting upon the top of the roll, and so curved in relation to the circle described by the wiper that the wings leave the guard under sufficient tension to increase the impetus given the particles by centrifugal force.

L and L′ are chutes which receive the particles of iron and convey them to a proper receptacle.

M is a chute which receives the particles of brass after they are separated.

N is a scraper against which the iron accumulates until the mass becomes great enough to drop by force of gravity onto the chute L′.

The operation of my machine is as follows: The mixture of brass and iron is placed in the hopper C, from which it drops to the apron E, and from that to the roll A, to which the iron adheres until removed by the wiper J, while the brass drops to the apron E′ and

thence to the roll A′, to which any remaining particles of iron adhere until removed by the scraper N, while the brass passes through the chute M to the receptacle prepared for it, the iron passing through the chutes L and L′ to a separate receptacle.

I do not confine myself to the particular feeding mechanism shown, as any one of numerous well-known mechanical devices may be employed for the purpose, it being only necessary to deposit the mixed particles thinly and evenly upon the roll.

I have shown in Fig. 2 a combined elevating and feeding arrangement, from which I have obtained excellent results. It not only saves the manual labor of raising the turnings to the elevated hopper, but also serves to feed them evenly and with any desired rapidity. O is an endless belt, provided with buckets, which lift the material and drop it on the inclined apron, from which it slides by force of gravity to the magnetic roll. This belt is driven by a shaft provided with cone-pulleys, (not shown in the drawing,) so that the rapidity of the feeding operation may be varied to suit the condition of the material acted upon.

I have shown in Fig. 3 a modification of the feeding-hopper, whereby the mass of particles rests directly upon the roll, which, by its rotation, carries away a continuous film, the thickness of which may be varied by raising or lowering the gate.

It may be observed that that portion of the core of the magnet which constitutes the roll A may be enlarged to any desired extent or varied in form, but I have obtained excellent results from a roll about three inches in diameter.

I am aware that rotating magnetic cylinders have heretofore been proposed for a similar purpose, constructed with a series of horseshoe-magnets, either electro or permanent, radiating from a shaft, so as to bring their poles in contact with the inner surface of a thin sheet-metal drum or otherwise. Such construction, however, fails to secure a uniform magnetic surface on the entire periphery of the drum, which is a very necessary condition where the particles of iron are minute, like filings, as they need to be seized by the magnetic influence the instant they touch the roll. Such machines are also complicated and expensive to build.

The construction of my improved machine is such that it can be cheaply built, and any part subject to wear can be readily replaced at small cost.

Having thus described my improved magnetic separator, I claim as my invention and desire to secure by Letters Patent—

1. In a magnetic separating-machine, the electro-magnetic roll, consisting of the shaft A and the helix B, wound upon a portion of its length and revolving therewith, substantially as described.

2. In a magnetic separating-machine, the combination of the rolls A and A′, the aprons E and E′, the rotating wiper J, the scraper N, and the chutes L, L′, and M, arranged to operate substantially as described.

3. In a magnetic separating-machine, the arrangement of the revolving wiper J, in combination with the guard K, substantially as described.

ALANSON WORK.

Witnesses:
JOHN C. PURKIS,
GILMAN E. JOPP.