

No. 758,655.

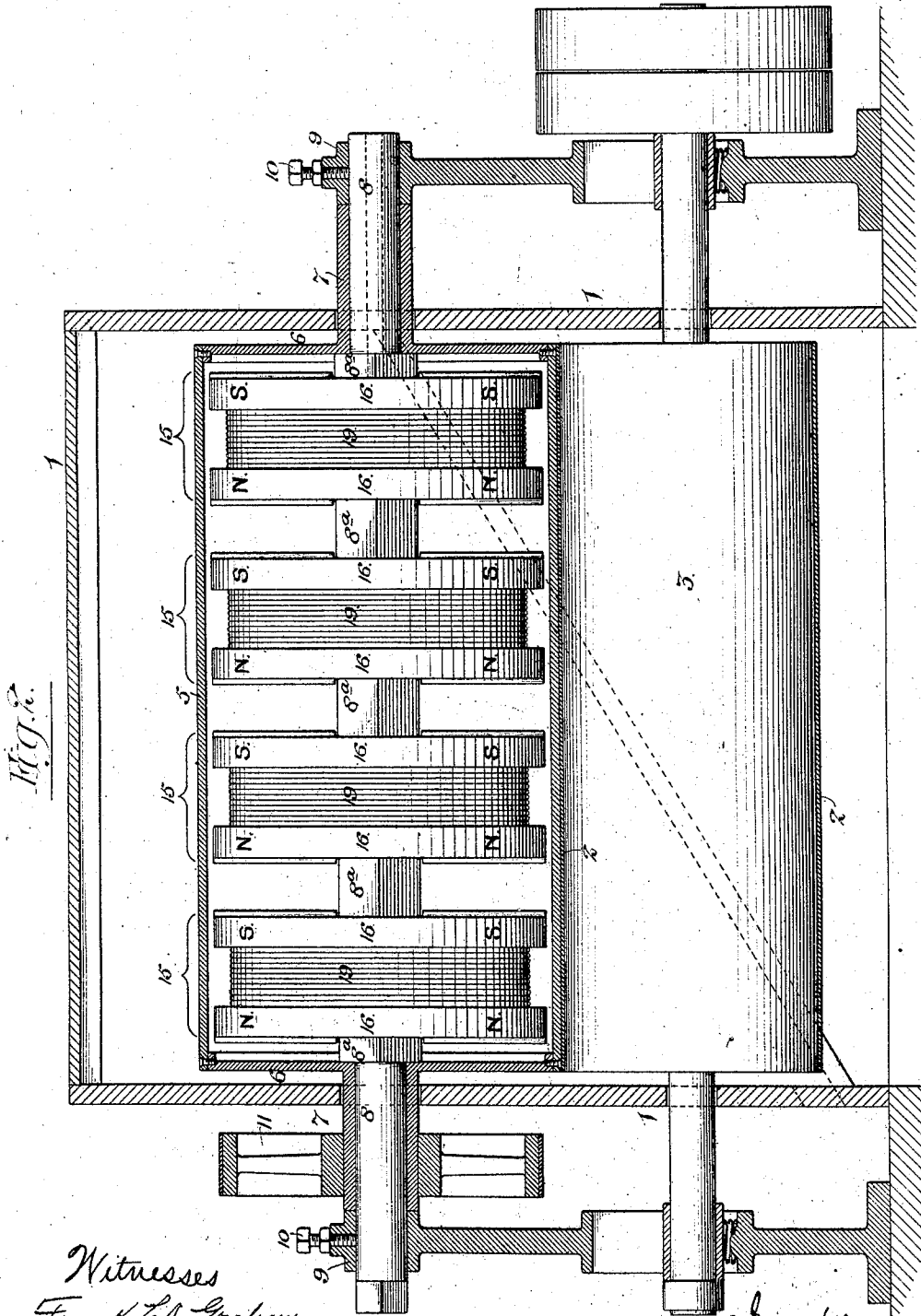
PATENTED MAY 3, 1904.

W. L. IMLAY.
MAGNETIC ORE SEPARATOR.

NO MODEL.

APPLICATION FILED OCT. 2, 1899.

3 SHEETS—SHEET 2.



Witnesses
Frank L. A. Graham
Robert S. Blake

Inventor
William L. Imlay
by his attorney
Howson & Howson

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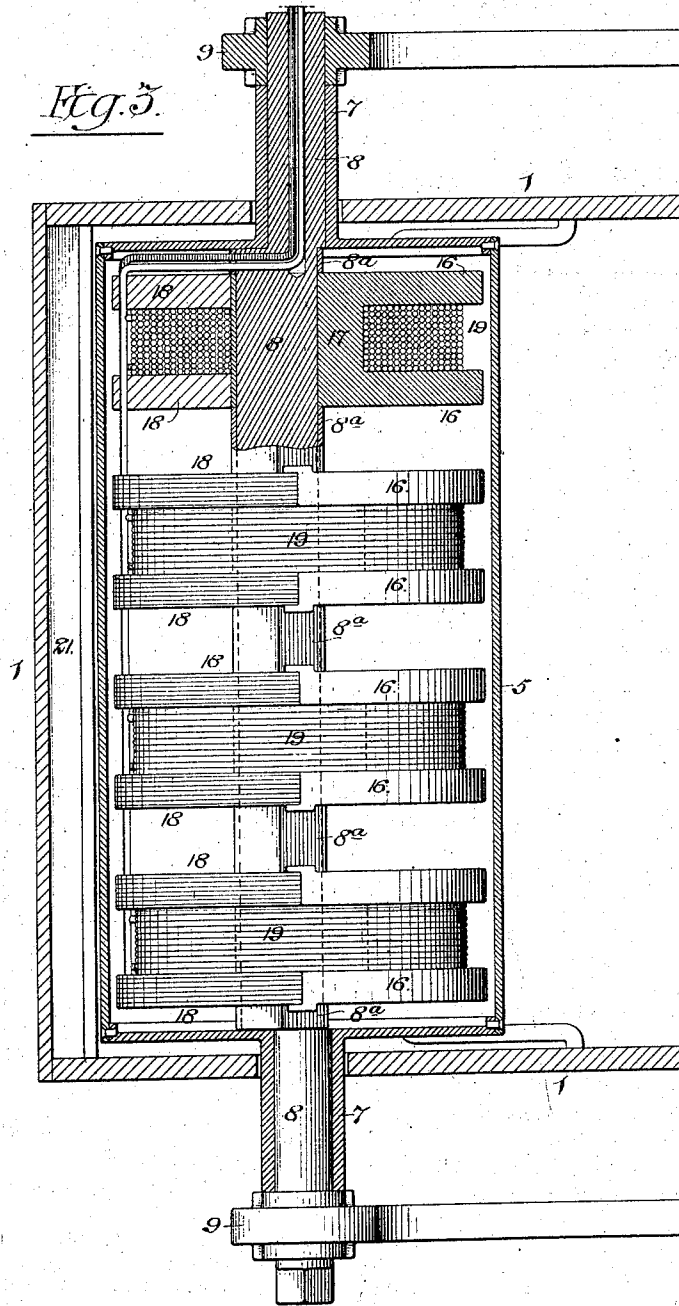
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UNITED STATES PATENT OFFICE.

WILLIAM L. IMLAY, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
ADOLPH SEGAL, OF PHILADELPHIA, PENNSYLVANIA.

MAGNETIC ORE-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 758,655, dated May 3, 1904.

Application filed October 2, 1899. Serial No. 732,349. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. IMLAY, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Magnetic Ore-Separators, of which the following is a specification.

My invention relates to that class of magnetic ore-separators in which the mixture of "ore" or magnetic material and "gangue" or non-magnetic material, which mixture is usually known as "stock," is brought into proximity to the surface of a revolving drum of non-magnetic material having magnets disposed within the same, the action of such magnets causing the separation from the gangue of the particles of ore which adhere to the surface of the drum and are carried around thereby until released from the attractive action of the internal magnets.

The main object of my invention is to simplify the construction and increase the separating capacity of a machine of this character, an object which I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view of a magnetic ore-separator constructed in accordance with my invention. Fig. 2 is a transverse section of the same on the line *a a*, Fig. 1; and Fig. 3 is a plan view, partly in section, the section being on the line *b b*, Fig. 1.

The machine comprises a casing 1, having in the lower portion of the same an endless belt 2, which is mounted upon drums 3 and 4, the shaft of one of said drums, preferably the drum 3, having power imparted thereto in any suitable manner, so as to cause the endless belt or apron 2 to travel in the direction of the arrow. Fig. 1.

Above the drum 3 is located the separator-drum 5, which is hollow and is composed of any suitable non-magnetic metal, the preferable construction of this drum being that shown in Fig. 2, on reference to which it will be observed that the drum consists of a cylindrical shell secured to opposite heads 6, each of which has a tubular hub 7, which is free to turn on a rod 8, mounted in bearings 9, so that it can be turned therein, set-screws 10

50 serving to secure the rod 8 in position after adjustment.

On one of the hollow hubs 7 is a pulley 11, which is driven by means of a belt 12 from a pulley 13 on the shaft of the drum 4, as shown, for instance, by dotted lines in Fig. 1, or said pulley may be driven by other means, so as to rotate the drum 5 at a certain speed, as hereinafter set forth.

That portion of the rod 8 which is within the cylinder 5 is of square or other polygonal form, and upon this portion of the rod are mounted a series of electromagnets 15, as shown in Fig. 2, each of these electromagnets consisting of a pair of segments 16, secured to or forming part of and projecting from a hub 17, which receives the rod 8, suitable sleeves 8^o being mounted upon the rod between the magnets and between the latter and the end of the drum, so as to maintain these parts in proper lateral relation to each other. Segments 16, of wood or other non-magnetic material, are fitted to the hubs 17 and fill out the circles of the segments 16, so as to provide drums upon which to wind the wire 19 for the passage of the electric current whereby the magnets 15 are energized.

It will be seen that each of the metallic segments 16 constitutes one pole of its magnet, one being the north pole and the other the south pole, and each segment is of the same polarity throughout its entire peripheral extent.

In the top of the casing 1 is a hopper 20 for receiving the stock from which the ore is to be separated, this hopper having a contracted opening which delivers onto the upper run of the belt 2, and at one end of the casing is a chute 21 for receiving the ore discharged from the surface of the drum 5, the gangue carried around the drum 3 by the belt 2 being delivered through an opening 22 in the table, bench, or other support upon which the machine is mounted.

Located between the drum 5 and the belt 2, as close as possible to the point of contact between them, is a bar 23, of magnetic metal, which is rendered magnetic by induction from the magnets in the drum 5 and which serves

to assist in effecting the separation of the ore from the gangue, the magnetic action of said bar having a tendency to draw the magnetic particles to the surface of the stock as the latter is carried beneath the bar, so that the said particles are in the best position for the action of the drum 5 when they come under the influence of the same, the presence of the bar 23, moreover, serving to render the action of the magnets 15 strongest in those portions which are nearest to the bar, and consequently to the stock upon the belt 2.

The operation of the machine will be fully understood on reference to Fig. 1, the stock being carried along by the belt 2 and being subjected first to the action of the induction-bar 23 and then to the action of the rotating drum 5, the magnetic particles of ore being caused to adhere to the periphery of said drum as soon as they come within the attractive power of the magnets 15 and the particles thus adhering to the drum being carried around in the direction of the arrow by the latter until they pass beyond the magnetic influence, whereupon they are discharged by centrifugal force from the surface of the drum and are received in the chute 21, by which they are directed to an appropriate outlet.

One of the main features of my invention is that the segmental poles of the magnets shall be of the same sign or polarity throughout their entire peripheral extent, as I find that the release of the magnetic particles from the surface of the drum is then effected almost immediately after such particles pass beyond the limit of the segmental poles of the magnet, and I am thereby enabled to rotate the separating-drum at higher speed than usual and to dispense with the use of all cleaning-brushes, scrapers, or other devices for removing the adhering magnetic particles from the surface of the drum.

In practice I prefer to rotate the drum 5 at such speed that the centrifugal action tending to throw the magnetic particles from the surface of the drum shall be almost equal to the magnetic attraction, whereby they are caused to adhere thereto, whereby the centrifugal force will act to discharge the particles from the surface of the drum immediately upon the

weakening of the magnetic attraction, due to the carrying of the particles beyond the limit of the segmental poles of the magnets.

In the present instance I have shown a series of four magnets contained within the separator-drum; but it will be evident that in carrying out my invention the number of magnets employed is immaterial, a single magnet only being sufficient in some cases.

It will be observed on reference to Fig. 1 that the square or polygonal portion of the rod 8, upon which the magnets 15 are mounted, does not occupy a position at the center of the hub of each magnet, but is set back some little distance from said center, so as to bring the preponderance of metal in the hub 17 of the magnet on that side upon which the magnetic force is to be exerted, thus decreasing the resistance of the magnetic circuit of each magnet to the greatest possible extent.

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

1. A magnetic ore-separating apparatus consisting of a rotating drum containing a magnet, said magnet having a hub carrying two sets of segments forming a drum and wire wound on said drum, certain of the segments being of magnetic material and forming the pole-pieces of the magnet and the others being of non-magnetic material and serving to retain the wire in position, substantially as described.

2. A magnetic ore-separating apparatus consisting of a rotating drum with internal magnets, an endless belt below said drum for feeding the stock to the under side of the same, and an induction-bar outside of the drum and above the upper surface of the belt on which the stock is deposited whereby said bar acts upon the stock magnetically and without the interposition of any foreign body before said stock reaches the drum, substantially as specified.

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

W. L. IMLAY.

Witnesses:

JOS. H. KLEIN,

FRANK E. BECHTOLD.