

(No Model.)

L. G. ROWAND.
MAGNETIC ORE SEPARATOR.

No. 596,719.

Patented Jan. 4, 1898.

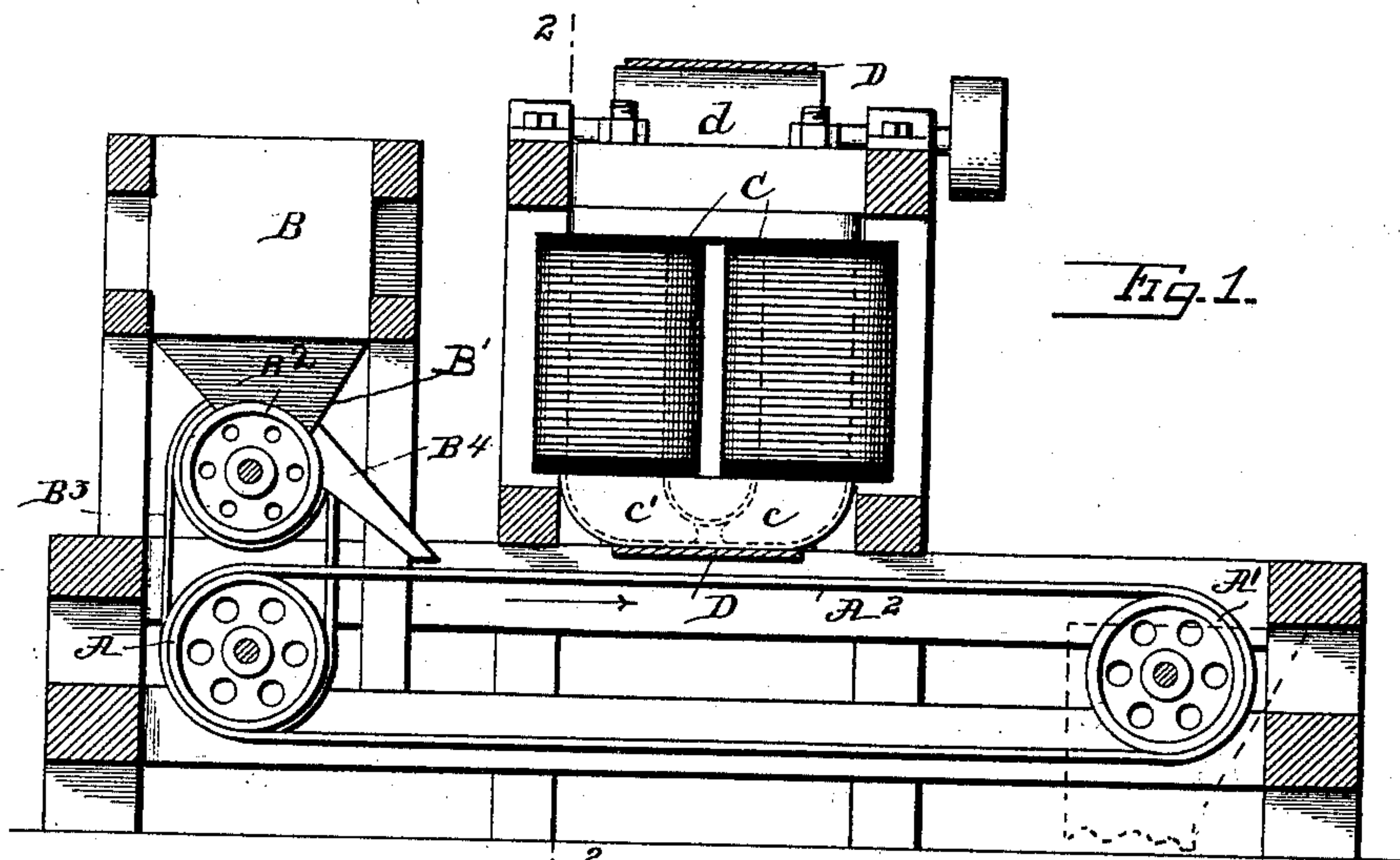


Fig. 1.

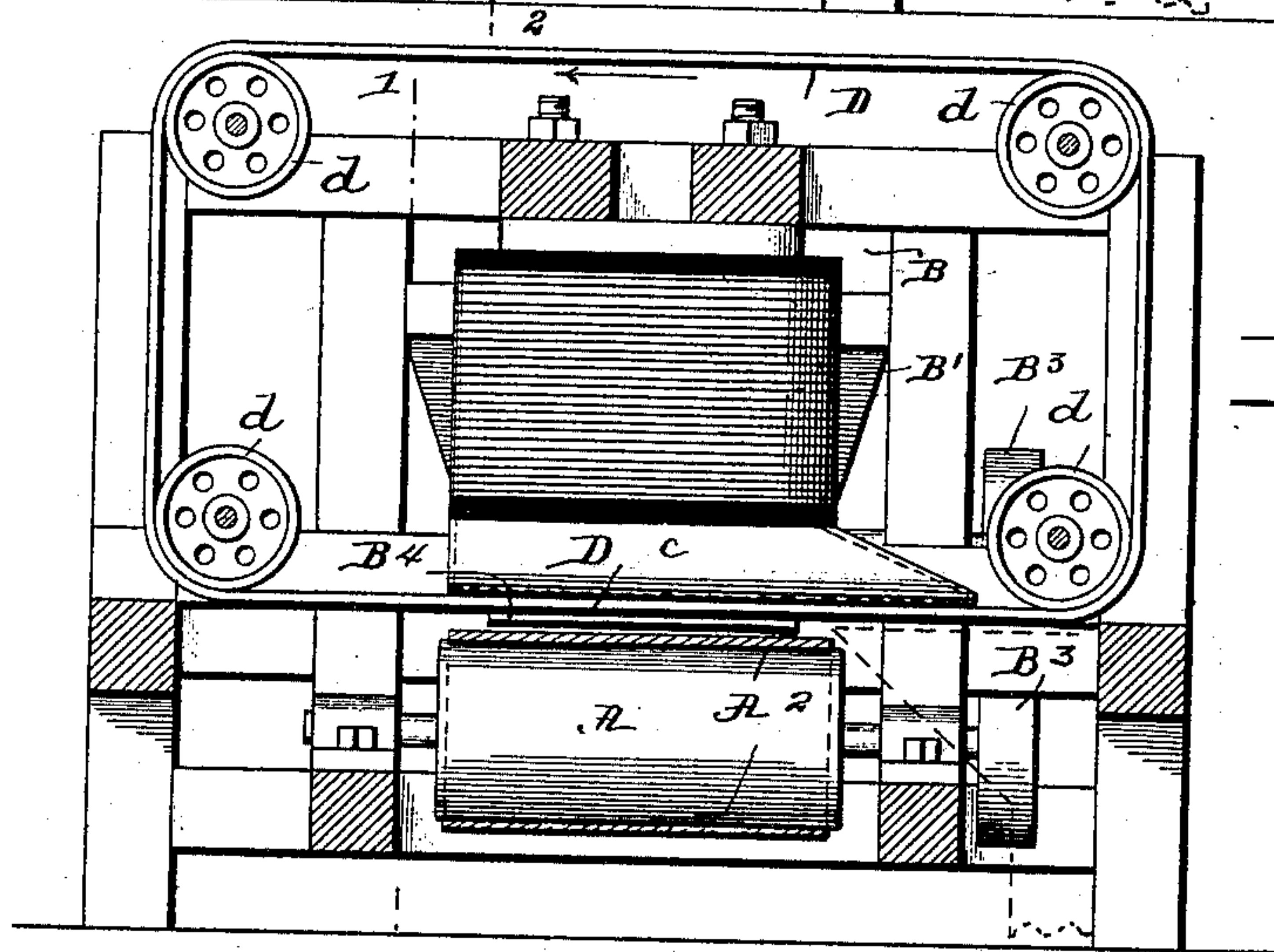


Fig. 2.

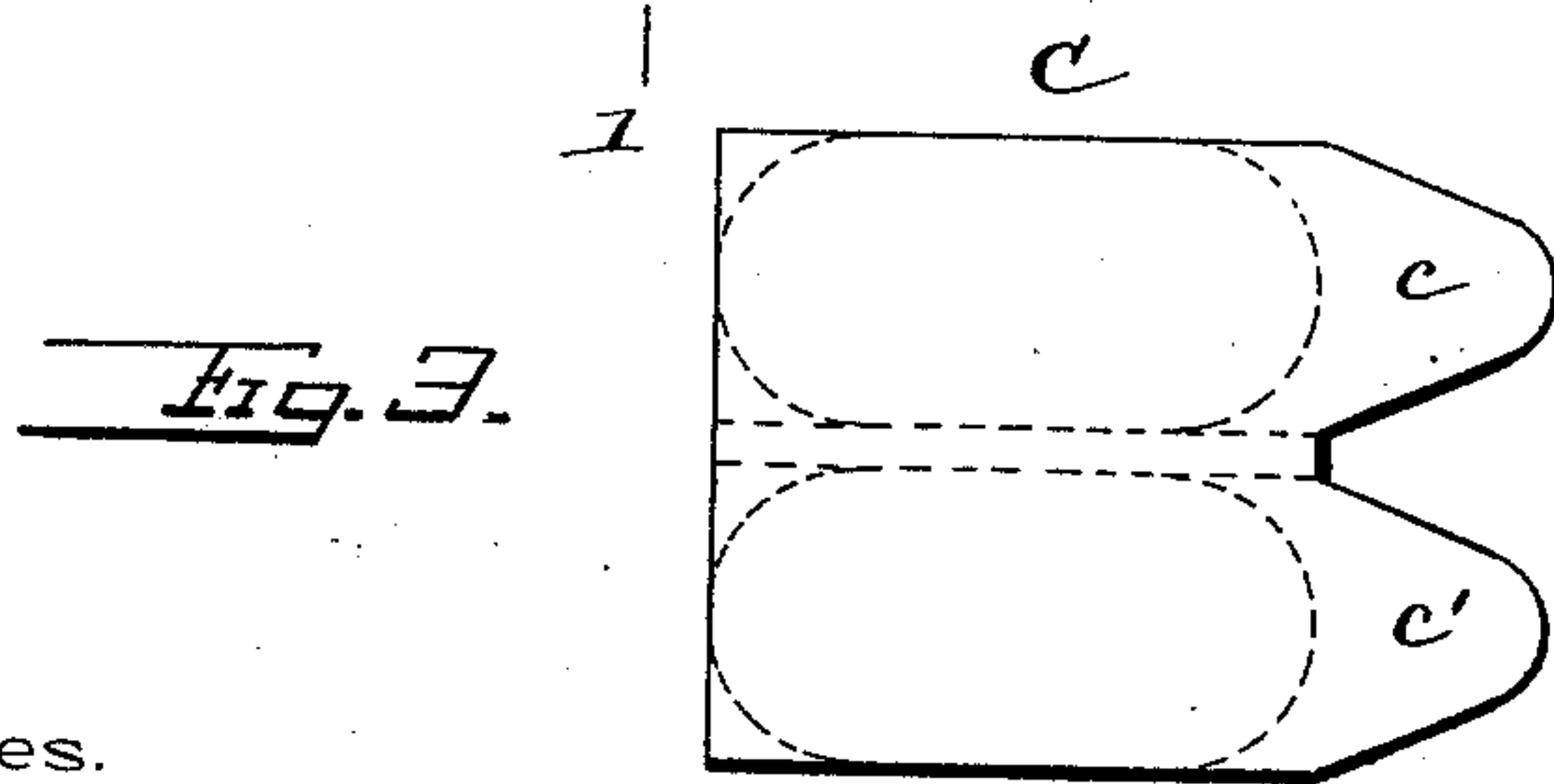


Fig. 3.

Witnesses.

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Fig. 4.

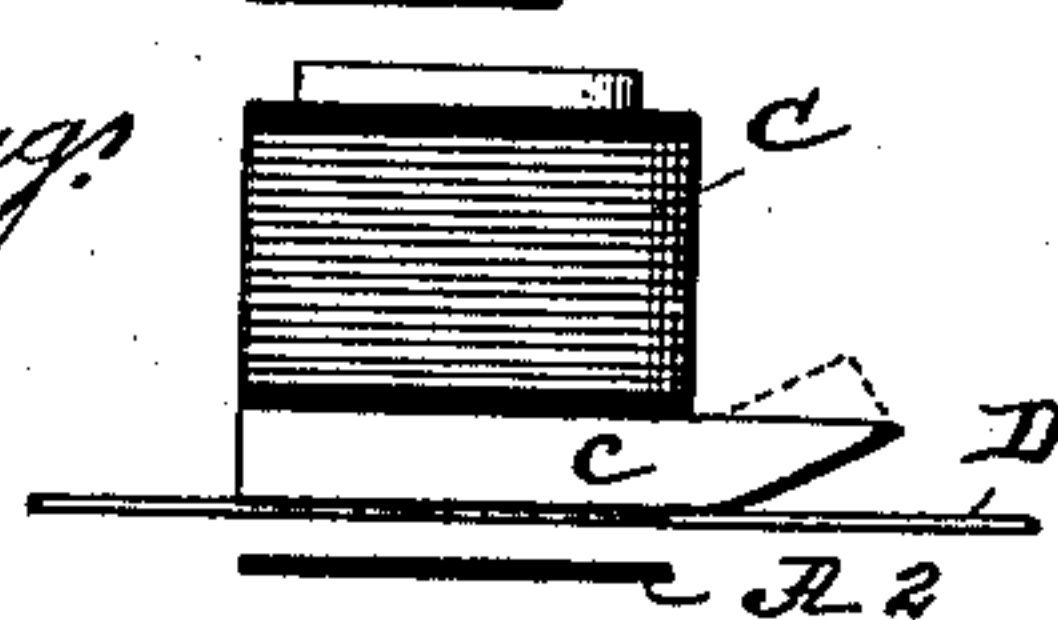
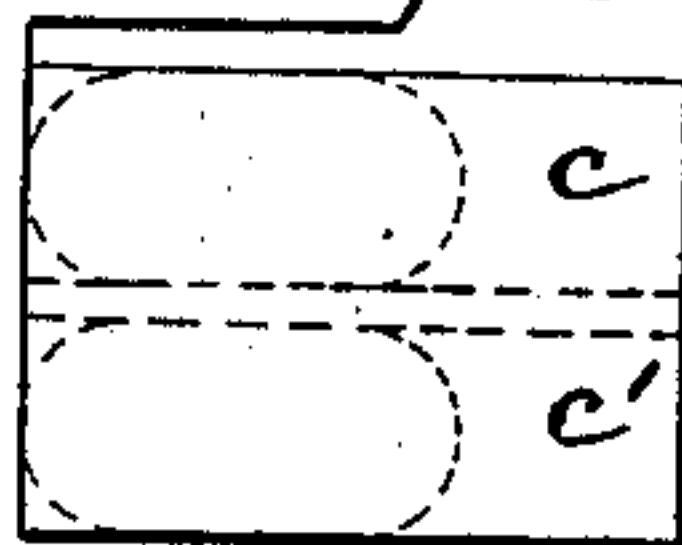


Fig. 5.



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MAGNETIC ORE-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 596,719, dated January 4, 1898.

Application filed April 15, 1897. Serial No. 632,211. (No model.)

To all whom it may concern:

Be it known that I, LEWIS G. ROWAND, a citizen of the United States, residing at Camden, county of Camden, and State of New Jersey, have invented a new and useful Improvement in Magnetic Ore-Separators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to certain improvements in that class of ore-separators in which the ore to be separated is, in a finely-divided condition, conveyed from the hopper by a conveyer-belt into the magnetic field of a magnet or series of magnets. In this magnetic field and at right angles to the conveyer-belt is a secondary or discharging belt, against which when the conveyer-belt brings the material within the magnetic field by reason of the magnetic force the magnetic material is lifted, the non-magnetic material being carried by the conveyer-belt beyond the magnetic field. The material lifted from the conveyer-belt to the discharge-belt is held upon or against the discharging-belt by the magnetic force until it (the discharging-belt) passes beyond the magnetic field, when it drops off. In the ordinary construction of the magnets the magnetic force from end to end of the magnet is constant. As a consequence, during all the period during which the ore attached to the discharge-belt is under the influence of the magnetic field it is under a constant and equal influence. This construction is ineffective for the reason that at the point when the discharge-belt passes beyond the pole-pieces there is as great magnetic attraction as at any other point, while there is a tendency for gravity to cause the material to leave the under side of the belt. Still the magnetic attraction is very great, tending to draw it back again toward the magnet. In practice this results in an accumulation of the magnetic ore at the point where the discharge-belt passes beyond the pole-pieces of the magnet, producing what might be called a "rolling" action—that is, as the discharge-belt passes beyond the pole-pieces the material previously held thereunder starts to drop from the discharge-belt, and

as it starts to drop it is acted upon by the magnetic force, which at that point is as strong as at any other point in the magnet, and is drawn back again toward the magnet, producing what might be called a "rolling" action, which accumulates the material at that point, which accumulation often is great enough to reach the main conveyer-belt and thus destroy the operation of the machine by causing again an admixture of magnetic and non-magnetic material. In any event this construction produces or causes ineffective action of the separation.

My invention consists in so constructing the pole-pieces that the magnetic field or strength of the magnetic field will be decreased as the discharge-belt passes from beyond the conveyer-belt to the end of the pole-pieces. In general I preferably accomplish this result by making the distance between the pole-pieces beyond the conveyer-belt greater than the distance at the receiving-point of the discharge-belt. Preferably this increase in the distance between the pole-pieces should be gradual, and in practice I prefer tapering the pole-pieces beyond the conveyer-belt, so that while the ore at the point where the conveyer-belt brings it beneath the pole-pieces is under the greatest magnetic action, when it is carried by the discharge-belt beyond the conveyer-belt the magnetic force gradually decreases until at the time it passes beyond the pole-pieces the force of gravity is greater than the force of the magnet, and as a consequence the material drops free from the belt without being influenced by the magnet.

I will now describe my invention as illustrated in the accompanying drawings, in which—

Figure 1 is a cross-section on the line 1 1 of Fig. 2. Fig. 2 is a cross-section on the line 2 2, Fig. 1. Fig. 3 is an inverted plan view of the magnet. Fig. 4 is a side elevation of a modified form of magnet. Fig. 5 is an inverted plan view of the same.

A A' are the main conveyer-belt rollers, driven by any proper means, and A² is the conveyer-belt.

B is the hopper, having the funnel-shaped mouth B'.

B² is the feed-roller, driven by a belt B³ from the shaft of the driving-roller A, and B⁴ is a spout connecting the mouth of the hopper B' with the conveyer-belt A².

5 C are the magnets, interposed adjacent to the conveyer-belt and having interposed between them and the conveyer-belt the discharge-belt D, which passes over the rollers d, its travel being at right angles to the conveyer-belt A². This discharge-belt may be
10 driven by any desired means.

The magnets C have the pole-pieces c c'. At the point where these magnets are adjacent to the conveyer-belt A² the pole-pieces
15 are close to each other, so that the lines of magnetic force passing from one pole-piece to the other have but a short distance to traverse, and as a consequence are of the greatest intensity at that point.

20 As the pole-pieces extend over the discharge-belt beyond the conveyer-belt in the direction of movement of the discharge-belt, they are formed on a taper which causes the distance between the pole-pieces to increase
25 gradually, thus gradually reducing the magnetic force after the discharge-belt passes away from the conveyer-belt. In general the construction will be such that when the conveyer-belt reaches the point of greatest divergence of the pole-pieces the magnetic force
30 will be but slightly greater, if greater at all, than the force of gravity, so that when the belt passes beyond these pole-pieces the material will fall by force of gravity without being effected by the attraction of the adjacent
35 magnet. By this construction I am enabled to operate an ore-separator of this character without any danger of the material taken by the discharge-belt being prevented from
40 freely falling from that belt after it passes beyond the pole-pieces of the magnet, and

thus the defects of the previous construction hereinbefore set out are entirely avoided.

In Figs. 4 and 5 the reduction of the magnetic force of the magnets is produced by cutting away on an incline the ends of the pole-pieces or bending up the same, so that at that
45 portion of the pole-pieces they are farther from the discharge-belt and make the lines of magnetic force exercise a less influence
50 over the material.

Having now fully described my invention, what I claim, and desire to protect by Letters Patent, is—

1. In a magnetic ore-separator, the combination of a conveyer-belt adapted to convey
55 the material to be treated, a discharging-belt passing over and beyond and at an angle with the conveyer-belt, a magnet above said belts at the crossing-point and extending above
60 the discharge-belt beyond the conveyer-belt, the pole-pieces of the magnet extending along said discharging-belt, the distance between the pole-pieces increasing along said discharging-belt beyond the conveyer-belt.
65

2. In a magnetic ore-separator, the combination of a conveyer-belt adapted to convey
70 the material to be treated, a discharging-belt passing over and beyond and at an angle with the conveyer-belt, a magnet above said belts at the crossing-point and extending above the discharge-belt beyond the conveyer-belt, the pole-pieces of the magnet extending along said discharging-belt, the ends of said pole-pieces beyond the conveyer-belt being tapered.
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In testimony of which invention I have hereunto set my hand.

LEWIS G. ROWAND.

Witnesses:

CAROL H. DESHONG,
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