

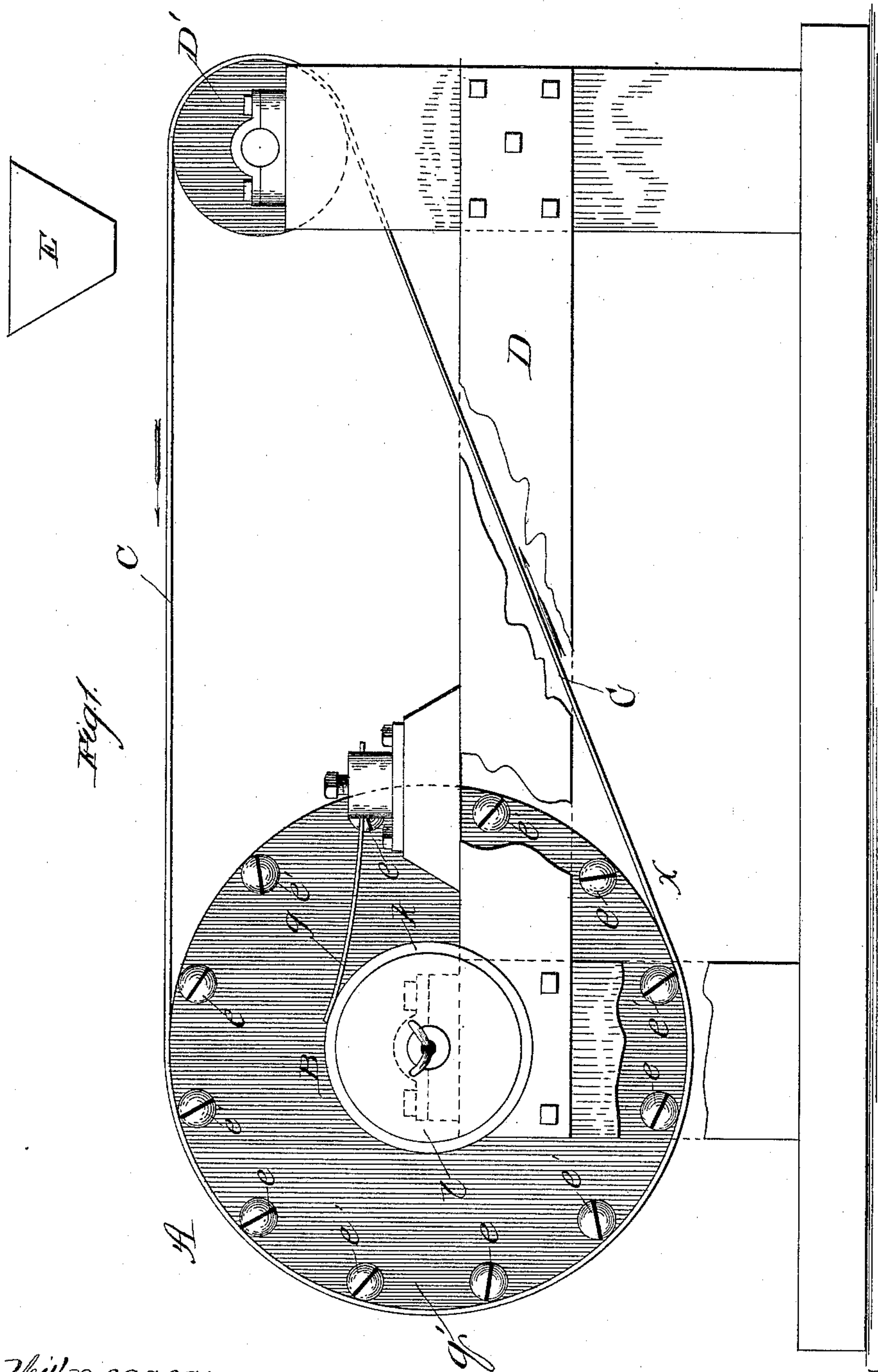
(No Model.)

3 Sheets—Sheet 1.

G. S. FINNEY.  
MAGNETIC SEPARATOR.

No. 432,823.

Patented July 22, 1890.



Witnesses:  
Clifford W. White,  
J. H. Dyrenforth

Inventor  
George S. Finney,  
By Dyrenforth & Dyrenforth,  
Attys.

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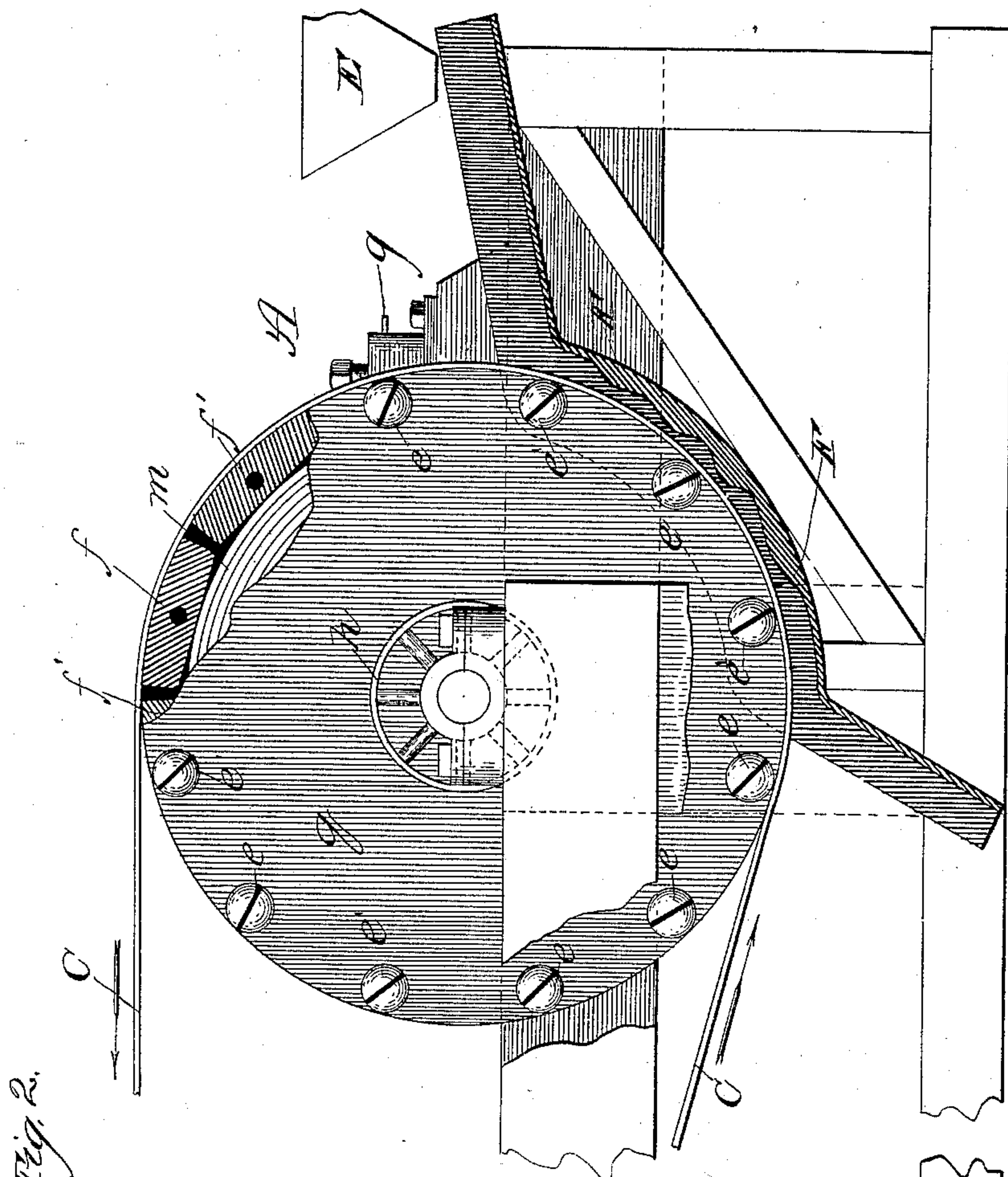
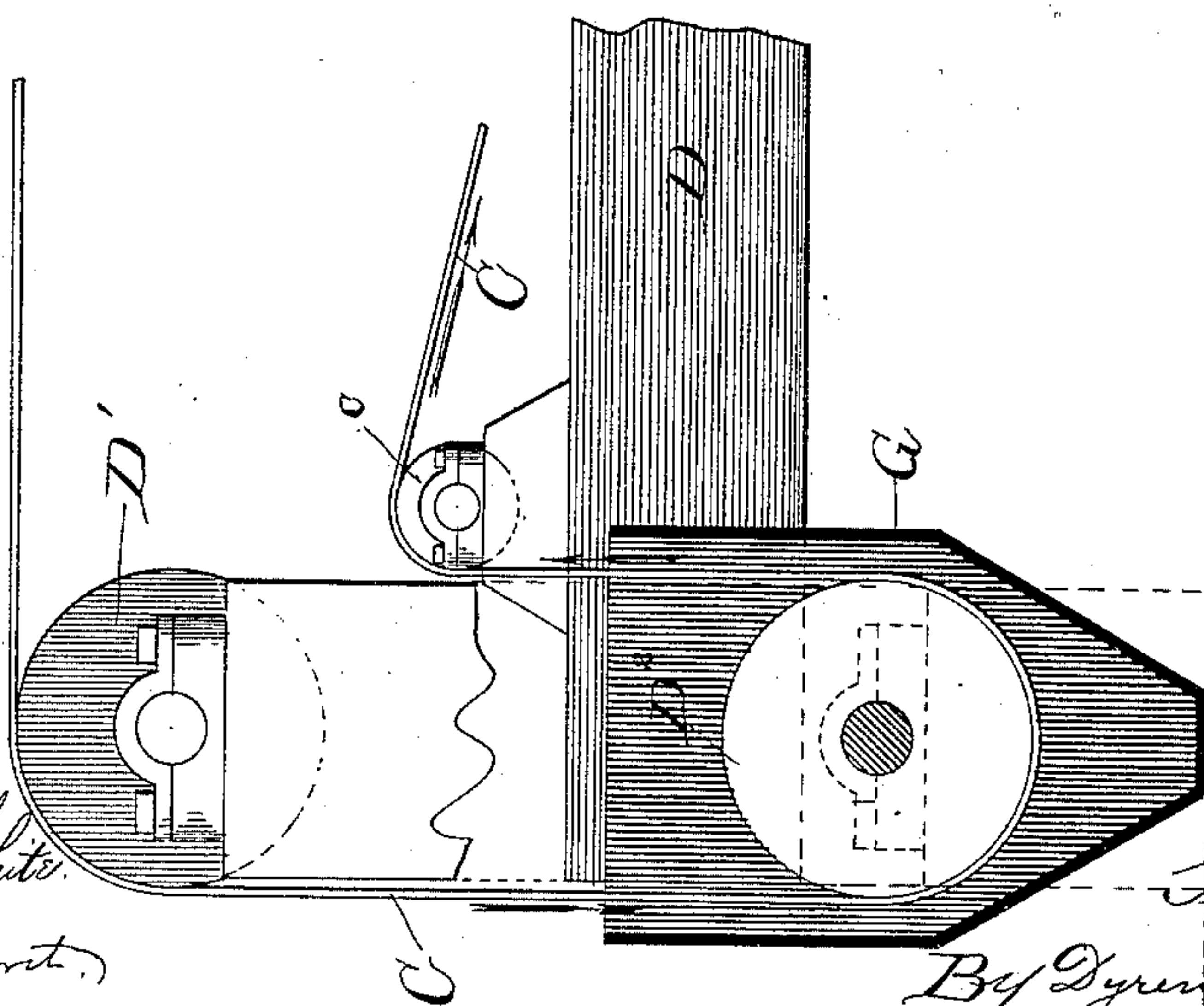


Fig. 2.



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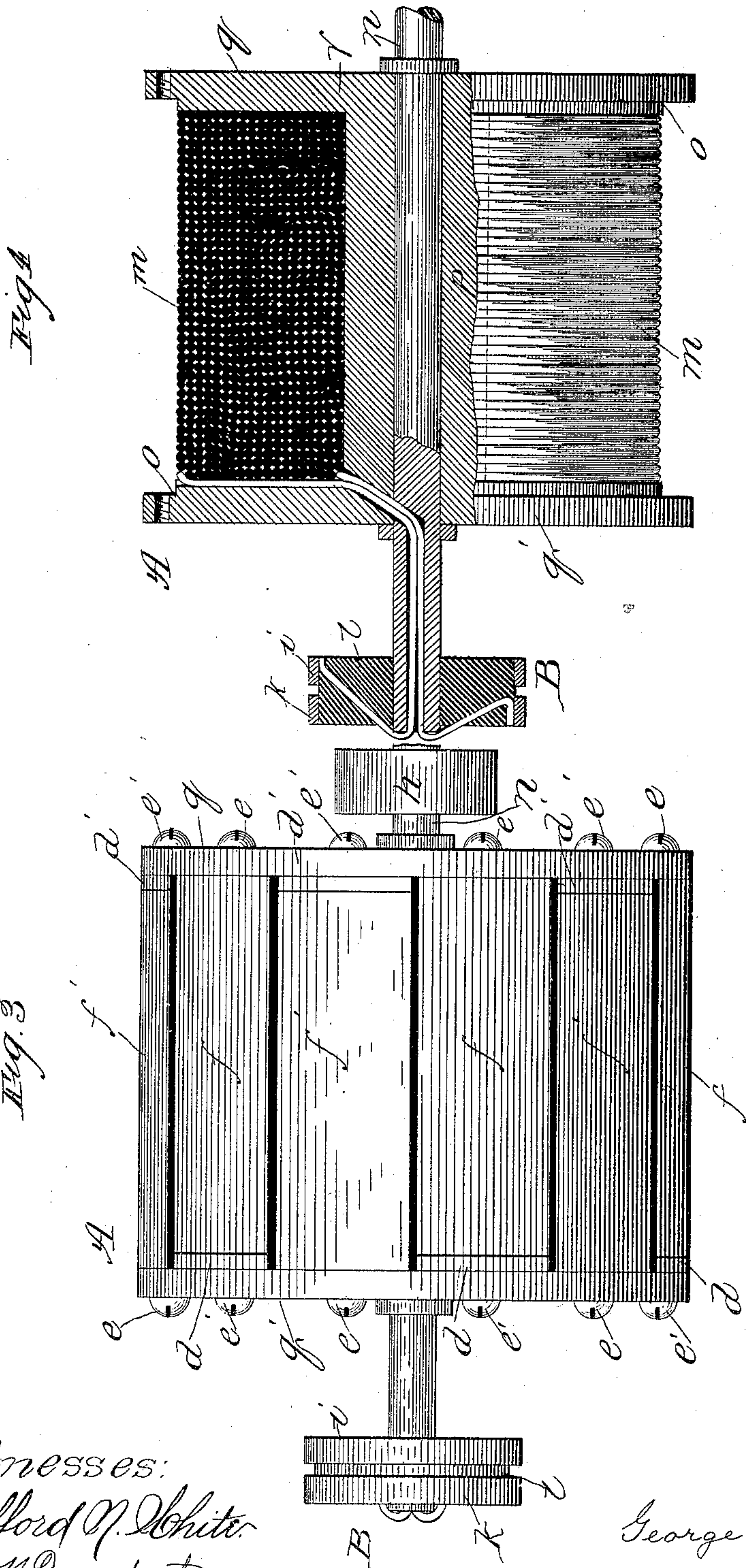
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# UNITED STATES PATENT OFFICE.

GEORGE S. FINNEY, OF CHICAGO, ILLINOIS.

## MAGNETIC SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 432,823, dated July 22, 1890.

Application filed November 11, 1889. Serial No. 329,884. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE S. FINNEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Magnetic Separators, of which the following is a specification.

My invention relates particularly to an improvement in the class of magnetic separators in which are employed a magnetic wheel and an endless belt of non-magnetic material surrounding the wheel and serving to support the material while being treated.

The objects of my invention are to provide an improved construction of the magnetic wheel, thereby to render the machine the more effective in its operation, and to provide a generally-improved construction of separator readily adaptable for treatment of ore either in a dry or wet condition.

In the accompanying drawings, Figure 1 is a view in side elevation, partly broken, of my improved machine, showing it in the form best adapted for dry separation; Fig. 2, a similar view of the same in the form best adapted for wet separation; Fig. 3, a view in elevation of my improved magnetic wheel; and Fig. 4, a view of the same, partly in sectional elevation.

A is the magnetic wheel. As shown, the wheel A is formed of soft metal to be magnetized from an extraneous generator and exert a magnetic influence only while the machine is in operation. Obviously, however, the wheel may be formed to retain its magnetism and thus be permanently magnetic, which latter construction, though not the preferred, is intended to be included as within the spirit of my invention.

The wheel A, as illustrated, comprises a spool *r* of readily-magnetizable metal, the heads *q* and *q'* being of considerably greater diameter than the body portion *p* and being provided with offsets *o* in their inner edges. The relative diametrical and longitudinal dimensions found best for its purpose are in the proportion of four to five.

The shaft *n* should be hollow, as shown, part way through from one end, to enable the terminals of the insulated wire *m*, with which the spool is wound up to the offsets *o*, to be

led through it to the transmitter B, which, as shown, comprises a disk *l*, of hard rubber, on one end of the shaft and surrounded on opposite sides of the center of its periphery with metal bands *i* and *k*, to which, respectively, the terminals of the wire *m* are connected. The opposite end of the shaft may carry the means for transmitting motion to the wheel—such as the belt-pulley *h*—and current is supplied to the wheel A by means of brushes *g* applied to the bands *k* and *i*.

The heads *q* and *q'* of the spool *r* are extended by the metal bars *f* and *f'*, which constitute the pole-pieces extended from the opposite ends of the spool and are insulated from each other and caused to alternate between the heads and thus cross the plane in which the wire *m* is wound. The bars *f'* extend from the head or positive end *q*, being fitted into the respective offset *o*, where each is secured by an iron screw *e*, and each bar *f* reaches short of the opposite head or negative pole-piece *q'*, insulating-pieces (brass) *d* being inserted between the ends of the bars *f* and the head *q'*, to which the said bars are secured through the insulating pieces by brass screws *e'*. The bars *f'*, which alternate around the wheel with the bars *f*, extend from the offset *o* in the head *q'*, being secured thereto by iron screws *e* and insulated from the opposite head *q* by interposed pieces of insulating material (brass) *d'*, through which the bars are secured to the adjacent head *q* by brass screws. It will thus be seen that the poles of the magnetic wheel are extended across its periphery, and the magnetic field is around the two lateral edges and the end of each bar *f* and *f'*. These bars are preferably parallel with each other and extend parallel with the body portion *p* of the spool; but regularity in the direction of their extension is not of great importance, provided they extend crosswise (at any desired angle or angles) of the plane of the circumference of the wheel.

C is the endless apron of any suitable non-magnetic material—as canvas or rubber—surrounding the wheel A, which is journaled in an appropriate frame D, supporting a roller D', around which the apron or belt C is also passed. This describes the machine



illustrated in Fig. 1, and which is especially adapted for dry separation, the operation being as follows:

The proper connection being made with a generator (dynamo or battery) through the medium of the brushes *g*, the wheel A is revolved, causing the belt C to travel as indicated by arrows. Pulverized ore is then fed, as through a hopper E, to the apron, which carries it to the wheel, where the magnetic particles will be attracted around the edges of the bars *f* and *f'*, and thus separated from the non-magnetic particles, which drop from the wheel when carried sufficiently far around, while the magnetic particles are held by the magnetism of the wheel on the apron till it reaches the point *x*, Fig. 1, beyond the influence of the wheel, where the separated particles of metal drop.

For operating with wet ore I provide a riffle-duct F, through which to lead the wet material from the hopper E to the wheel A, (which then should revolve in the direction opposite that of the wheel in Fig. 1,) and the apron C passes around a second roller D<sup>2</sup> in a sluice-box G, and also around a guide-roller *c*.

Of the wet ore fed through the riffle-duct F the wheel A takes up only the magnetic portion, the apron carrying it from the wheel to the sluice-box, where it is washed off. The tailings pass off directly from the riffle-duct.

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

1. A magnetic wheel for a separator, comprising a single magnet having the poles extended from its opposite ends crosswise of the plane of its circumference and forming elements of its cylindrical surface, substantially as described.

2. A magnetic wheel for a separator, comprising a metallic spool *r*, wound around the body portion *p* between the heads *q* and *q'*, with wire *m*, metal bars *f'*, extending from the head *q* toward the head *q'*, and metal bars

*f*, extending from the head *q'* toward the head *q* and alternating with the bars *f'*, substantially as described.

3. An electro-magnetic wheel for a separator, comprising a spool *r*, provided with off-sets *o* in its heads *q* and *q'*, and having wound upon its body portion *p* wire *m*, a shaft *n*, carrying a transmitter B, to which the terminals of the wire *m* are connected, bars *f*, extending from the head *q* toward and secured to and insulated from the head *q'*, and bars *f'*, extending from the head *q'* toward and secured to and insulated from the head *q* and alternating with the bars *f*, substantially as described.

4. In a magnetic separator, the combination, with a supporting-frame, of a magnetic wheel comprising a single magnet having the poles extended from its opposite ends crosswise of the plane of its circumference and forming elements of its cylindrical surface, and an endless apron C, passed around the said wheel and around a suitably-supported roller D', substantially as described.

5. In a magnetic separator, the combination, with a supporting-frame, of a magnetic wheel, a riffle-duct F, a sluice-box G, and an endless apron C, passed around the said wheel and having its path of travel extending through the sluice-box, substantially as described.

6. In a magnetic separator, the combination, with a supporting-frame, of a magnetic wheel having the poles extended crosswise of the plane of its circumference and forming elements of its cylindrical surface, a riffle-duct F, a sluice-box G, and an endless apron C, passed around the said wheel and having its path of travel extending through the sluice-box, substantially as described.

GEORGE S. FINNEY.

In presence of—

J. W. DYRENFORTH,  
M. J. FROST.