

(No Model.)

2 Sheets—Sheet 1.

C. G. BUCHANAN.
MAGNETIC ORE SEPARATOR.

No. 446,767.

Patented Feb. 17, 1891.

Fig. 4

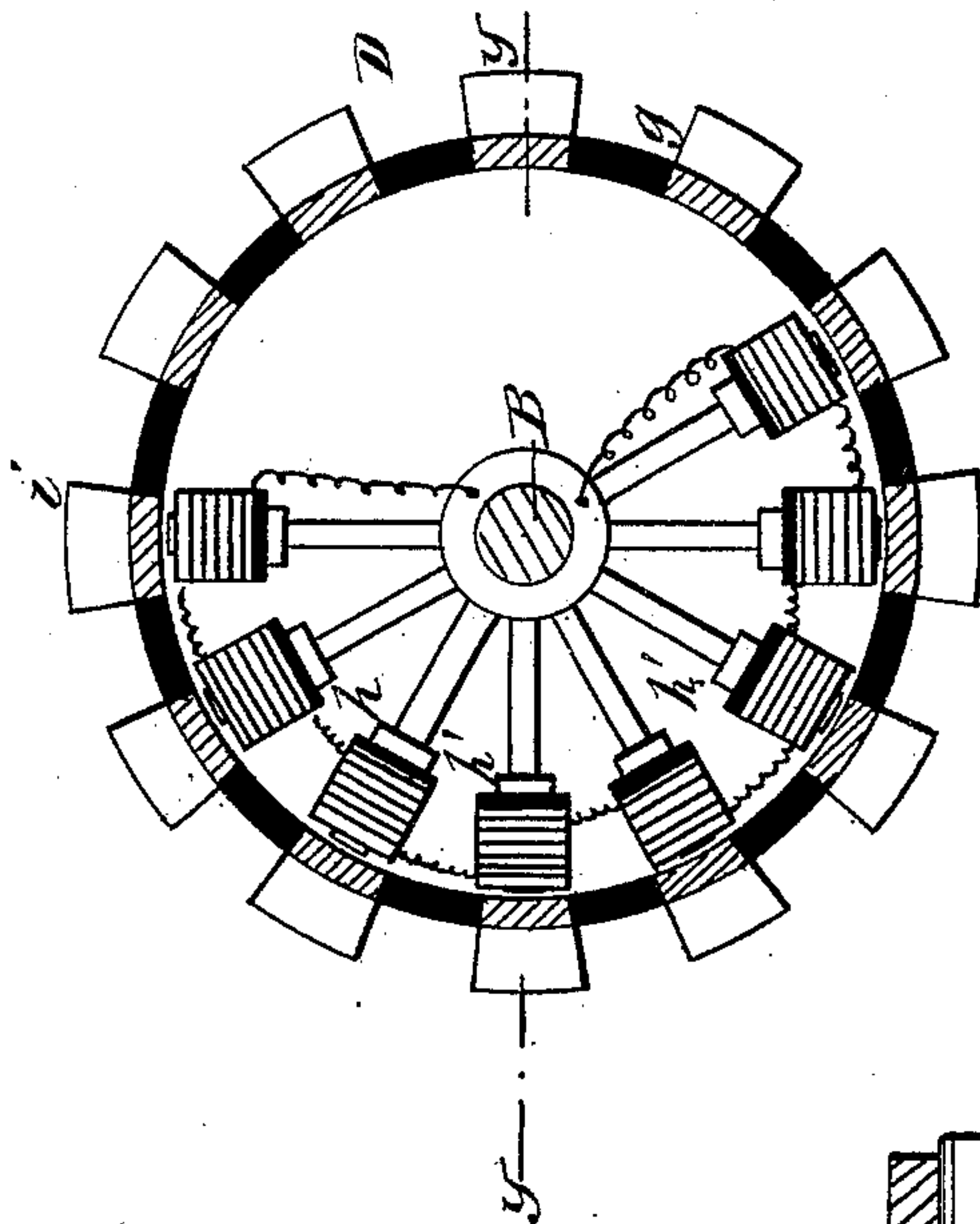


Fig. 5

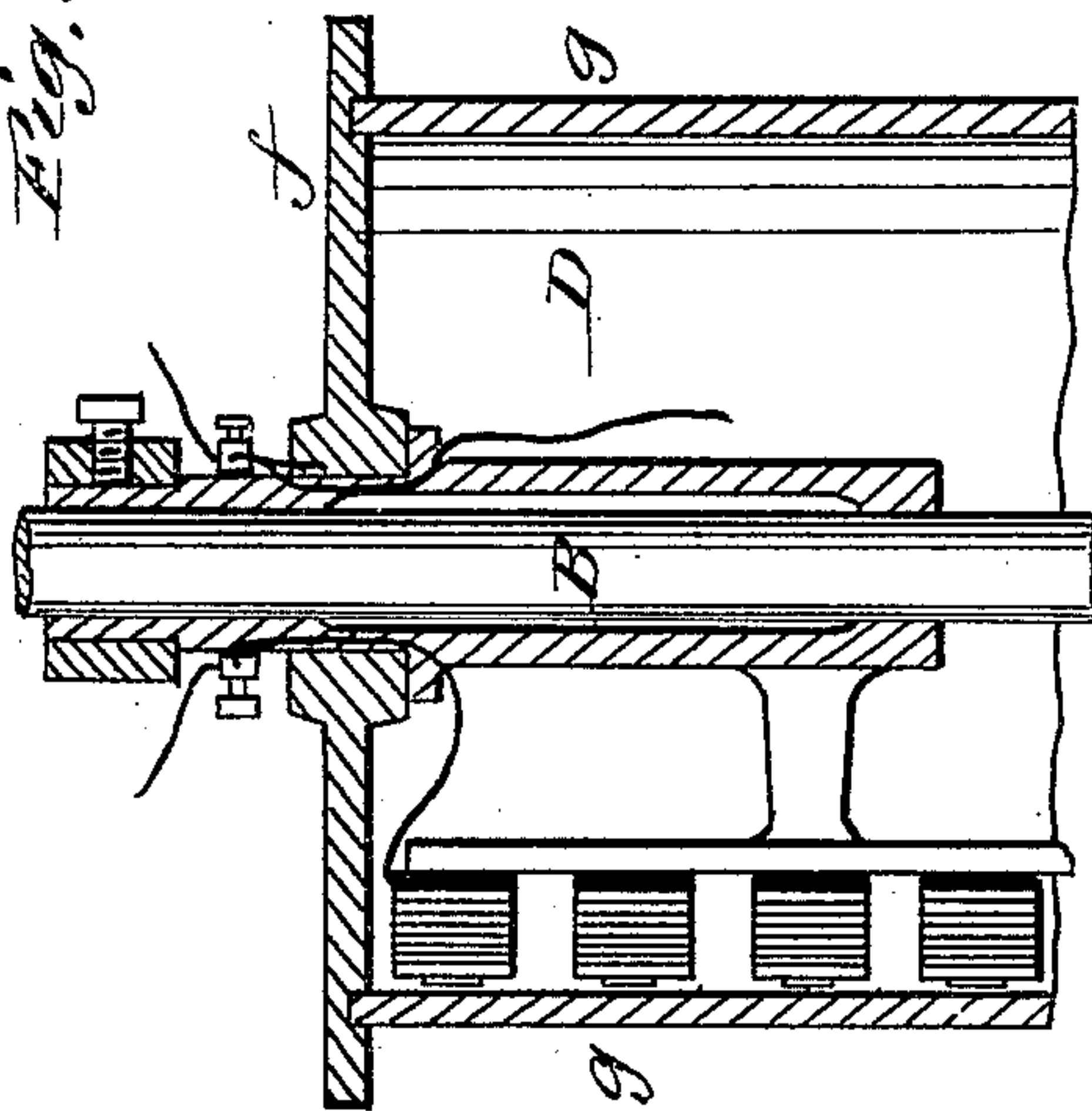
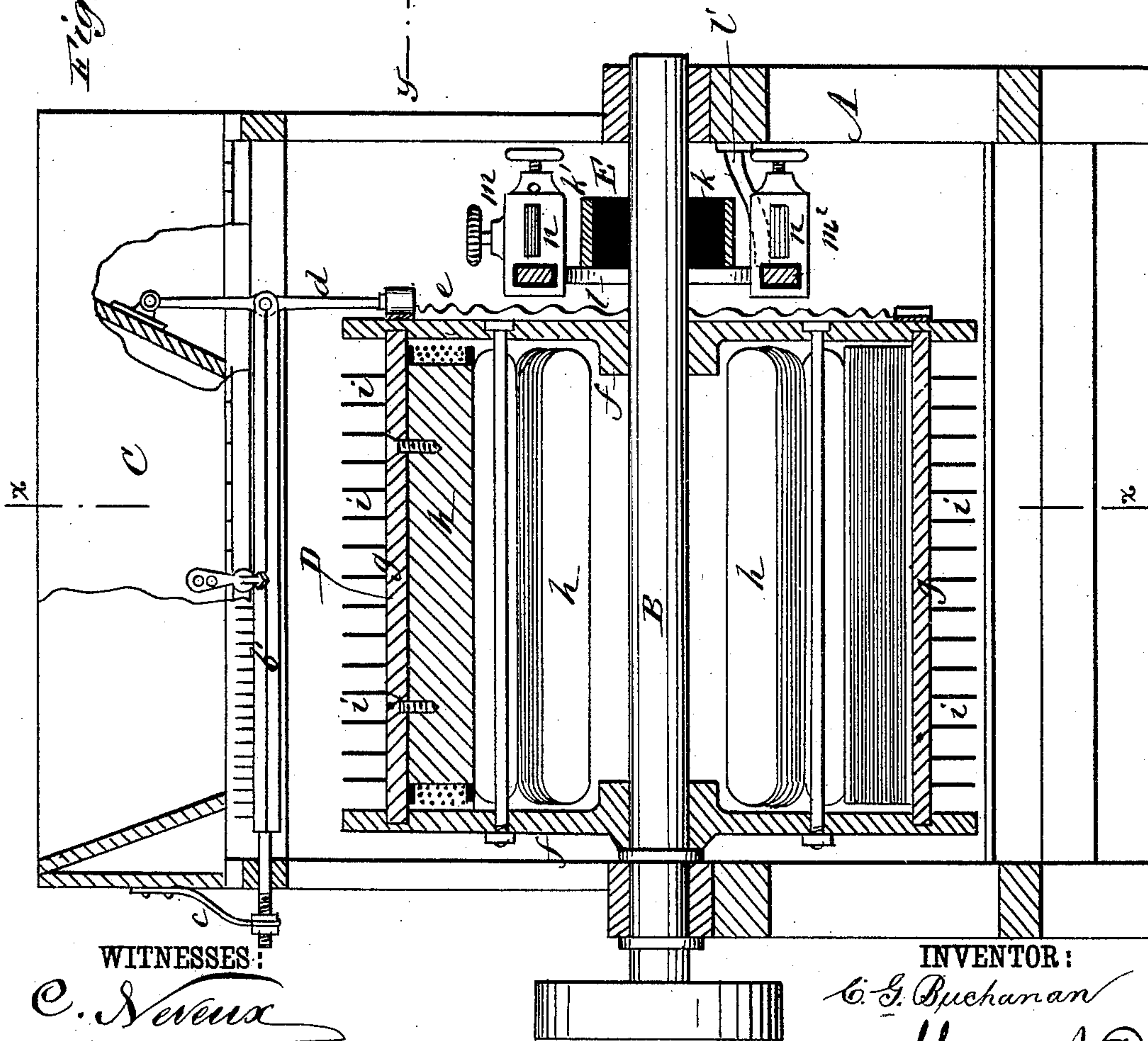


Fig. 1



WITNESSES:

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INVENTOR:

C. G. Buchanan
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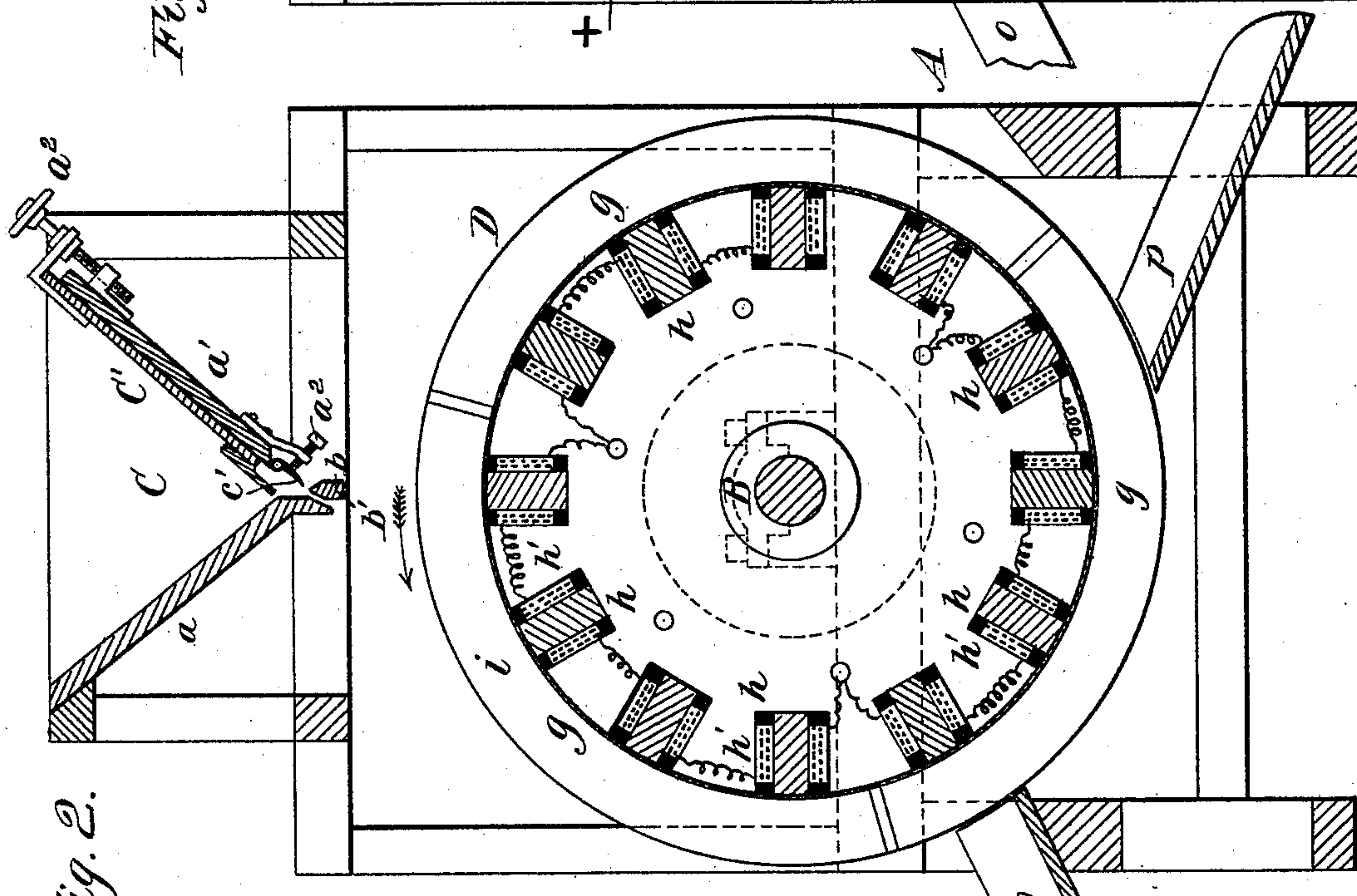
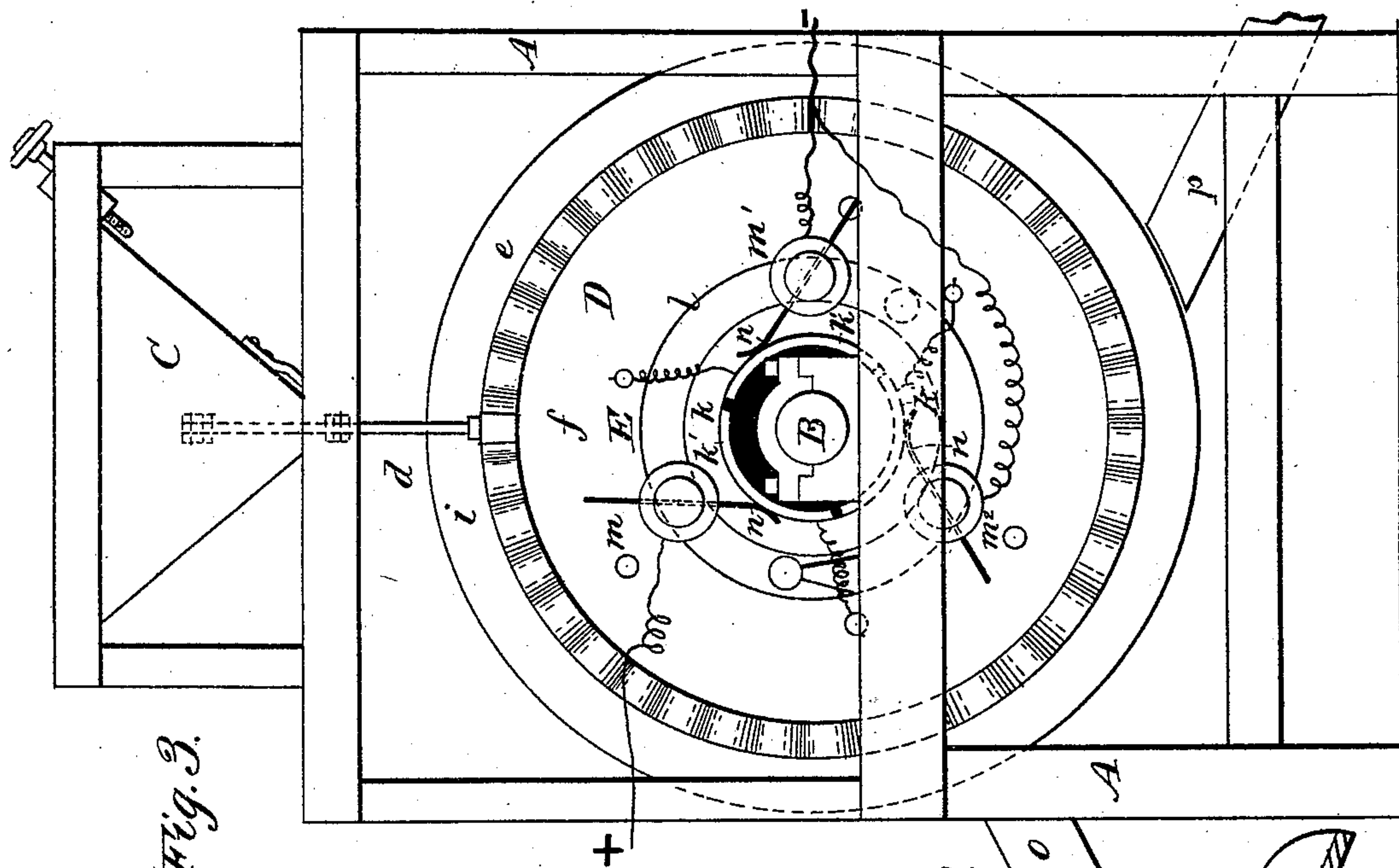
(No Model.)

2 Sheets—Sheet 2.

C. G. BUCHANAN.
MAGNETIC ORE SEPARATOR.

No. 446,767.

Patented Feb. 17, 1891.



WITNESSES:

WITNESSES:
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~~INVENTOR:~~

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UNITED STATES PATENT OFFICE.

CHARLES G. BUCHANAN, OF NEW YORK, N. Y.

MAGNETIC ORE-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 446,767, dated February 17, 1891.

Application filed February 25, 1890. Serial No. 341,710. (No model.)

To all whom it may concern:

Be it known that I, CHARLES G. BUCHANAN, of New York city, in the county and State of New York, have invented a new and Improved Magnetic Ore-Separator, of which the following is a specification, reference being had to the annexed drawings, forming a part thereof, in which—

Figure 1 is a vertical longitudinal section of one form of my improved ore-separator. Fig. 2 is a vertical transverse section of the same, taken on the line $x x$ of Fig. 1. Fig. 3 is an end elevation. Fig. 4 is a vertical transverse section of part of a modified form, and Fig. 5 is a horizontal section taken on line $y y$ in Fig. 4.

Similar letters of reference indicate corresponding parts in all the views.

The object of my invention is to construct an electro-magnetic ore-separator in which the pulverized ore is fed to the surface of a hollow cylinder of magnetic material and treated by magnets of different polarity, so as to turn the particles of ore and dislodge the non-magnetic portions.

My invention consists in the combination, with a hollow cylinder made wholly or in part of magnetic material, of a series of magnets arranged within the cylinder and connected up so as to produce positive and negative poles in alternation around the circumference of the cylinder.

It also consists in the combination, with the magnets, of a commutator carried by the cylinder-shaft and adapted to change the direction of the current through the magnets.

It also further consists in the combination, with the cylinder, of an ore-feeding hopper and a stirrer for insuring a uniform flow of ore to the separating-cylinder, all as will be hereinafter more fully described.

In the frame A is journaled a shaft B, upon which are mounted the cylinder-heads f . In circular grooves in these cylinder-heads are placed the ends of the segments g of the hollow cylinder D. These segments are made of thin curved plates of magnetic material and are separated along their adjacent edges by strips of non-magnetic material. The cylinder-segments g are each provided with series of circumferential flanges i to increase the mag-

netic surface, and the edges of the heads f are allowed to project beyond the segments g . Within the segments g are arranged inwardly-projecting magnet-cores h , which are surrounded by wire coils h' . These coils are connected so that the current passes in opposite directions around alternate magnet-cores, thereby producing magnetic poles around the periphery of the cylinder D, which are alternately positive and negative.

Upon the shaft B, at the end of the cylinder D, is mounted a three-part commutator-cylinder E, formed of the sections k' , mounted upon an insulating-core k . The magnets within the cylinder D are arranged in three groups of four magnets each, and the terminals of the groups are connected together and with the segment of the commutator-cylinder, as shown in Figs. 2 and 3.

Upon the ring l are mounted three commutator-brush holders $m m' m^2$, each holding a brush n , which presses upon the commutator-cylinder E. The ring l is supported by an arm l' , attached to the frame of the machine. The negative wire from the dynamo or battery is connected with the commutator-brush holders $m' m^2$, while the positive wire from the dynamo or battery is connected with the brush-holder m .

Above the cylinder D, upon the top of the frame A, is mounted a hopper C, which is adapted to contain ore and discharge it upon the periphery of the cylinder D. The hopper is provided with sloping sides $a a'$ and with a longitudinal slot in the bottom thereof. It is also furnished with a gate c' , operated by the screw a^2 and adapted to control the flow of pulverized ore through the slot in the bottom of the hopper.

To the lower edge of the side a' is hinged a regulating-valve c' , which is adjusted by a screw b , passing through an arm attached to the sloping side a' and bearing against the back of the valve. In the slot between the valve c' and the lower edge of the sloping side a is arranged a stirrer b' , which is provided with a series of pins projecting upwardly into the slot. One end of the stirrer is connected with a curved flat spring c , attached to one end of the hopper, and the opposite end is connected with a lever d , the

upper end of which is fulcrumed on the end of the hopper C. The lower end of this lever *d* carries a roller, which rides upon a cam *e*, projecting from the head of the cylinder D.

5 As the cylinder revolves the engagement of the cam *e* with the roller on the lever *d* causes the lever to vibrate and to impart a vibratory motion to the stirrer *b'*, and thus to cause a uniform flow of ore from the hopper to the

10 cylinder D. As the cylinder D revolves in the direction indicated by the arrow in Fig. 2, the ore delivered to it is carried over toward the discharge-spout *o*, and during its passage from the upper part of the cylinder D to the

15 spout *o* the polarity of the magnets is changed, so that the magnetic portion of the ore is made to turn, thus releasing the gangue and non-magnetic portions of the ore, allowing them to flow into the discharge-spout *o*, while

20 the magnetic portions of the ore adhere to the periphery of the cylinder and are carried forward to a point above the discharge-spout *p*, where the commutator changes the direction of the current, so that currents of the same

25 name enter the group of magnets upon this

side of the cylinder from opposite ends, thus destroying the magnetism of the magnets and allowing the magnetic material to be discharged into the spout *p*.

In the modified form shown in Figs. 4 and 5 the arrangement of the parts is such as to produce substantially the same effects. In this case, however, the magnets *h h'* are held in a fixed position, while the cylinder D is revolved around the series of magnets.

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

In a magnetic ore-separator, a hollow cylinder composed of alternating segments of magnetic and non-magnetic material, a series of electro-magnets arranged to polarize the magnetic portions of the cylinder, and means for reversing the polarity of the electro-magnets, substantially as specified.

CHARLES G. BUCHANAN.

Witnesses:

GEO. M. HOPKINS,
EDGAR TATE.