No. 793,137. PATENTED JUNE 27, 1905.

E. LANGGUTH.

ELECTROMAGNETIC ORE SEPARATOR.

APPLICATION FILED JUNE 18, 1904.

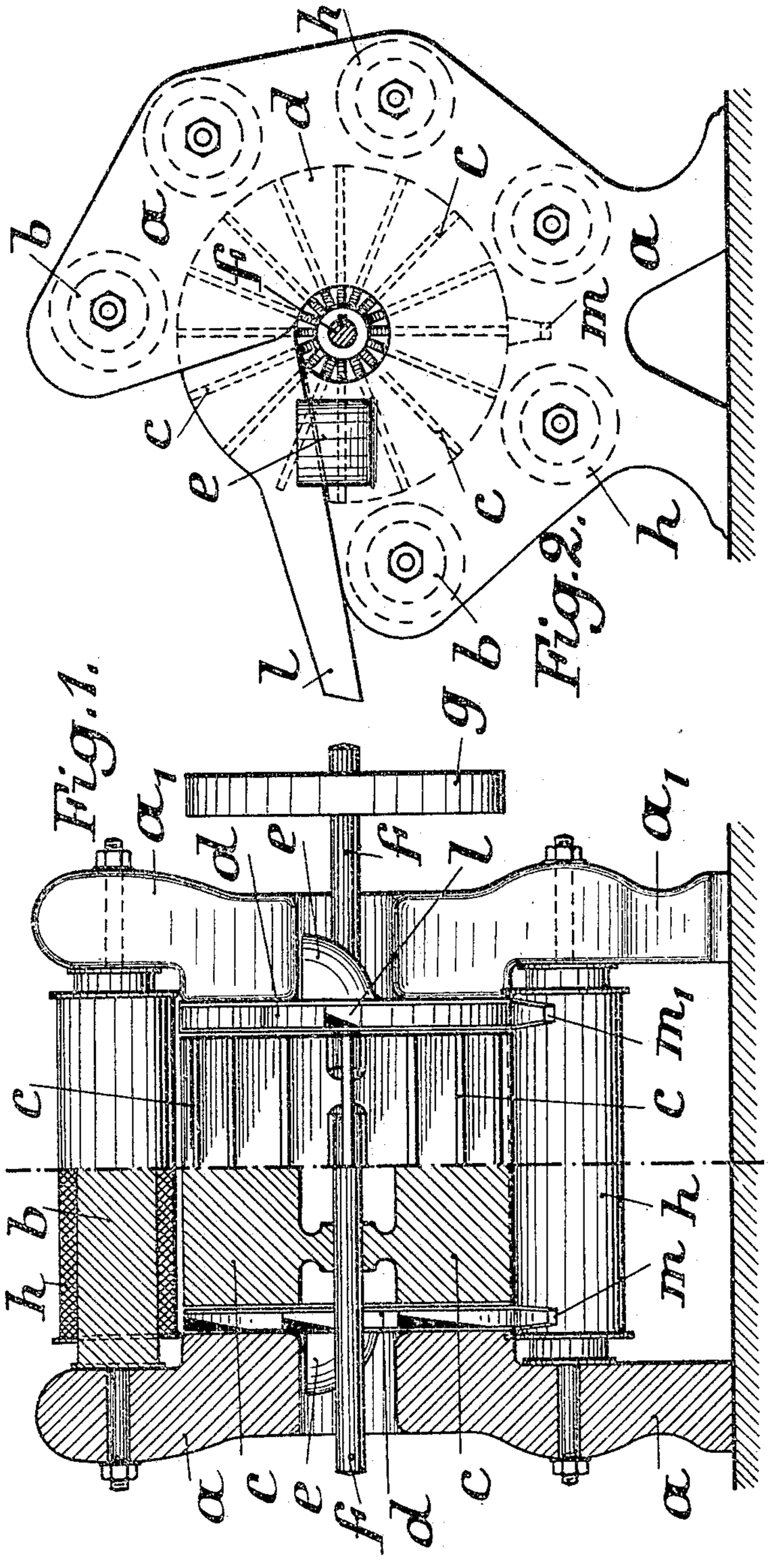

Fig. 2.

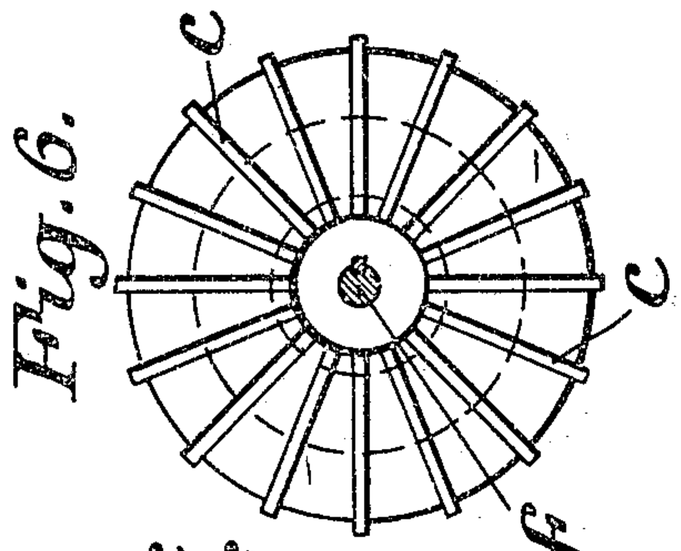

Fig. 6.

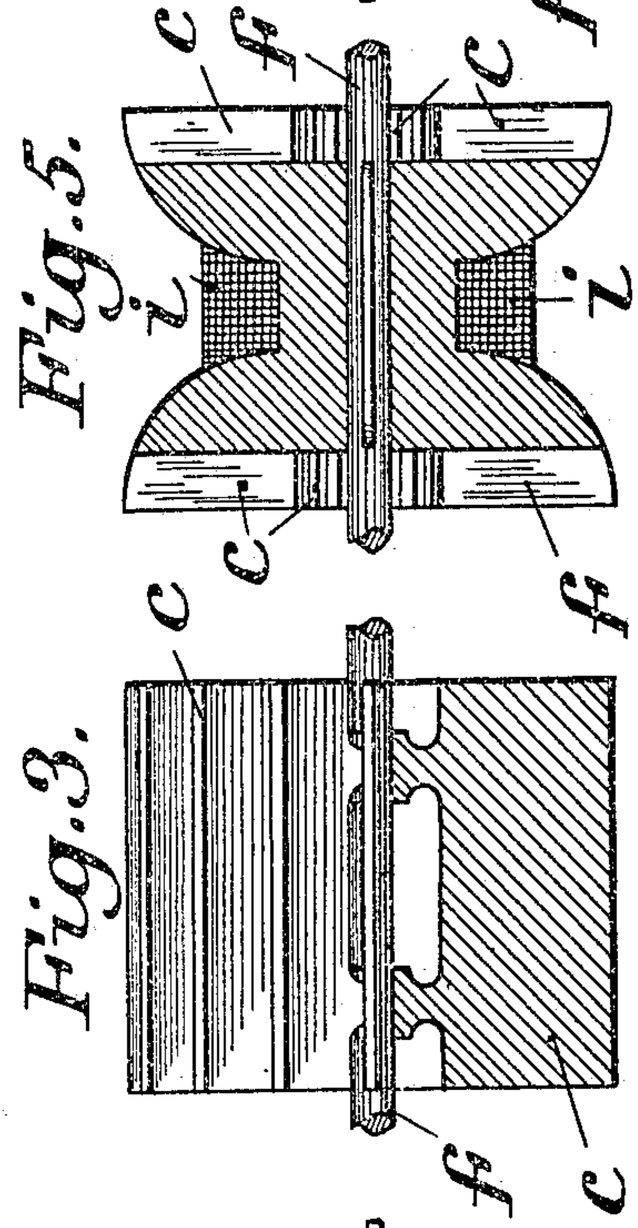

Fig. 5.

Fig. 1.

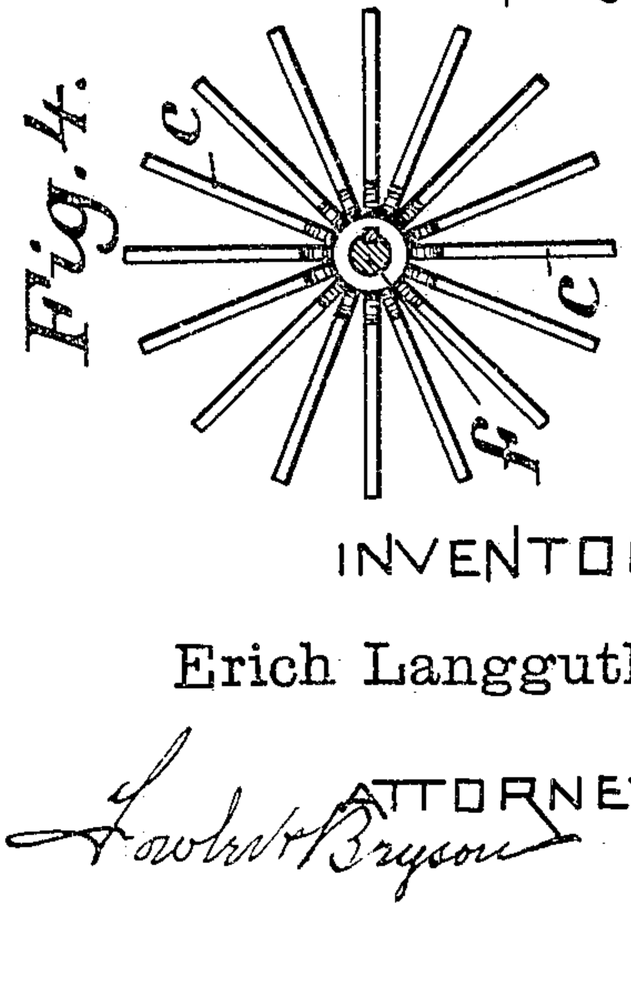

Fig. 3.

Fig. 4.

WITNESSES

W. A. Alexander

Fred Hauke.

INVENTOR

Erich Langguth

ATTORNEYS

Lowler & Bryson

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UNITED STATES PATENT OFFICE.

ERICH LANGGUTH, OF EUSKIRCHEN, GERMANY.

ELECTROMAGNETIC ORE-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 793,137, dated June 27, 1905.

Application filed June 18, 1904. Serial No. 213,132.

To all whom it may concern:

Be it known that I, ERICH LANGGUTH, engineer, a subject of the German Emperor, residing at Koelnerstrasse 137, Euskirchen, Prussia, Germany, have invented a certain new and useful Improvement in Electromagnetic Ore-Separators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention refers to electromagnetic ore-separators, and more especially to that class of separators in which a non-magnetic screen is interposed between the active surfaces of the magnets and the material, and the latter is conveyed along such screen, and thereby distributed according to the degree of magnetic properties of its constituents.

The invention consists in a specific disposition of the rotating parts of the active electromagnet by which the field is divided into a number of radially-disposed stripes which retain and convey the magnetic particles of the ore and permit the non-magnetic material to drop out between the single radii as the latter in rotating approach a vertical position.

My invention also comprises certain dispositions relating to the shape of the stationary pole-pieces by which the field is interrupted on part of the circumference of the rotating armature, thus permitting the magnetic particles to be collected.

In the accompanying drawings, Figure 1 is a side elevation of my improved separator, partly shown in section; Fig. 2, a front elevation; Fig. 3, a side elevation of the armature, partly shown in section; Fig. 4, a front elevation of the armature. Fig. 5 is a longitudinal section of the armature, showing a slight modification; and Fig. 6 is a front elevation of the form of armature shown in Fig. 5.

The same letters of reference are used in all the figures to indicate corresponding parts.

The magnetic cores *b*, preferably made of soft wrought-iron and provided with exciting-coils *i*, are disposed between two opposite pole-pieces *a* and *a'*, which also serve as a supporting-frame for the whole apparatus. The inside faces of the pole-pieces are flat, and the armature *c* is arranged to rotate between them. It is supported on a shaft *f*, supposed to be journaled in suitable bearings, (not shown,) and is provided with a sheave *g* or other means by which it can be revolved, as will be readily understood by those expert in the art. The armature itself consists of a system of radially-disposed flat pieces, as shown in Figs. 3 and 4, and is preferably made of soft wrought-iron or other material of high magnetic permeability. As shown in Figs. 3 and 4, the armature is not arranged to receive an exciting-coil; but in such cases in which it is found desirable to provide a separate excitation for the armature the radial pieces are shaped as shown in Figs. 5 and 6, in which the exciting-coil appears in section.

By reference to Fig. 2 it will be seen that the stationary pole-pieces *a* and *a'* do not cover the whole circumference of the armature ends, a sector of nearly ninety degrees being cut out on one side above the middle.

Between each end of the armature and the inside faces of the pole-pieces *a* and *a'* a flat case or drum *d*, of non-magnetic material, is interposed in such a way that it is held stationary in the position shown in the drawings. The drum *d* is provided with a hopper *e* and a discharge-pipe *l*, the latter being disposed in an oblique position just above the lower side of the sector cut out in the pole-pieces. At the bottom of the drums *d* a discharge-opening *m* is provided for the non-magnetic particles of the material that is to be treated.

The operation of my improved separator is as follows: The armature is rotated by means of the sheave *g* or other driving device, and the windings *i* and *i'* are excited. The material is then fed into the hopper *e*. All the magnetic particles will form clusters adhering to the inside surfaces of the drums *d* opposite the ends of the armature-pieces *c*. As the latter revolve they will carry the clusters of magnetic particles along with them. The non-magnetic constituents of the ore are not influenced, and the particles forming them are therefore free to fall downward between the radial stripes formed by the clusters of magnetic material. Thus this non-magnetic

material collects at the bottom of the drum and passes out at the discharge-opening *m*. The magnetic material is carried upward until it reaches that part of the drum *d* which faces the cut-out sectors. Here no lines of force pass through the drum, and therefore the material is released and drops down into the discharge-pipe *l*, from where it can be collected in any usual manner.

Having now particularly described and ascertained the nature of my said invention and the manner in which the same is to be performed, I declare that what I claim is—

1. In a magnetic separator, the combination with a primary pole-piece, of a rotary member provided with a plurality of secondary pole-pieces and arranged to rotate adjacent to and parallel with said primary pole-piece, part of the path of said rotary member being out of the field of influence of said primary pole-piece, and a casing of non-magnetic material between said primary pole-piece and said rotary member.

2. In a magnetic separator, the combination with a pair of primary pole-pieces, of a rotary member provided with a plurality of secondary pole-pieces and arranged to rotate between and parallel with said primary pole-pieces, part of the path of said rotary member being out of the field of influence of said primary pole-pieces, and casings of non-magnetic material between said rotary member and said primary pole-pieces.

3. In a magnetic separator, the combination with primary pole-pieces in the form of sectors, of a rotary member provided with a plurality of secondary pole-pieces and rotating between said primary pole-pieces, and stationary non-magnetic screens interposed between said primary pole-pieces and said rotary member.

4. In a magnetic separator, the combination with primary pole-pieces in the form of sectors, of a rotary member provided with central pole-pieces and rotating between said primary pole-pieces, and drums of non-magnetic material interposed between said primary pole-pieces and rotary member, said drums each being provided with a feed-opening and two discharge-openings.

5. An electromagnetic ore-separator consisting of the following parts, to wit, a stationary field-magnet having parallel cores, means for exciting said cores, pole-pieces contacting the ends of said cores and having flat inner surfaces, said pole-pieces being cut away so as to form sectors of about two hundred and seventy degrees, an armature consisting of radially-disposed flat pieces of high permeability means for rotating said armature and stationary non-magnetic screens interposed between said pole-pieces and said armature.

6. In an electromagnetic ore-separator the combination of the following instrumentalities to wit: a stationary field-magnet composed of parallel cores means for exciting said cores, pole-pieces contacting the ends of said cores and forming sectors of about two hundred and seventy degrees, an armature consisting of radially-disposed flat pieces of high permeability means for rotating said armature and flat drums made of non-magnetic material, such drums being stationarily interposed between said armature and said pole-pieces and having a feed-opening and two discharge-openings.

7. In an electromagnetic ore-separator the combination of the following instrumentalities to wit: A stationary field-magnet having parallel cores means for exciting said cores, pole-pieces contacting the ends of said cores and shaped so as to form sectors of about two hundred and seventy degrees, an armature composed of radially-disposed flat pieces of high permeability means for rotating said armature flat drums of non-magnetic material stationarily interposed between said armature and said pole-pieces and having a feed-opening near the lower side of the cut-away part of the pole-pieces and two discharge-openings, one of which is disposed at the lowest point of the said drum and the other of which just above the lower side of the cut-away part of the pole-pieces.

8. In an electromagnetic ore-separator the combination of the following instrumentalities, to wit: A stationary field-magnet having parallel cores, means for exciting said cores, pole-pieces contacting the ends of said cores and shaped so as to form flat sectors of about two hundred and seventy degrees, an armature composed of radially-disposed flat pieces of high permeability, means for rotating said armature, flat drums of non-magnetic material having a feed-opening near the lower side of the cut-away part of the pole-pieces and a discharge-opening disposed above said feed-opening and another discharge-opening at the bottom of the said drums, and means for separately exciting said armature.

In testimony whereof I have hereunto set my hand and affixed my seal in the presence of the two subscribing witnesses.

ERICH LANGGUTH. [L. S.]

Witnesses:

WILHELM KUEPPERS,

PAUL GORMAUL.