

(No Model.)

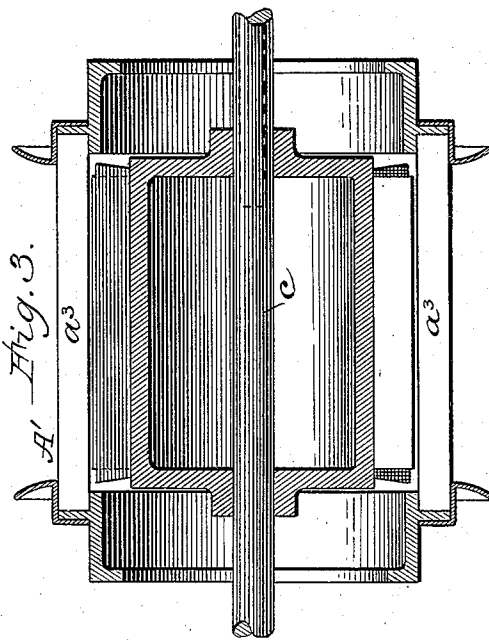
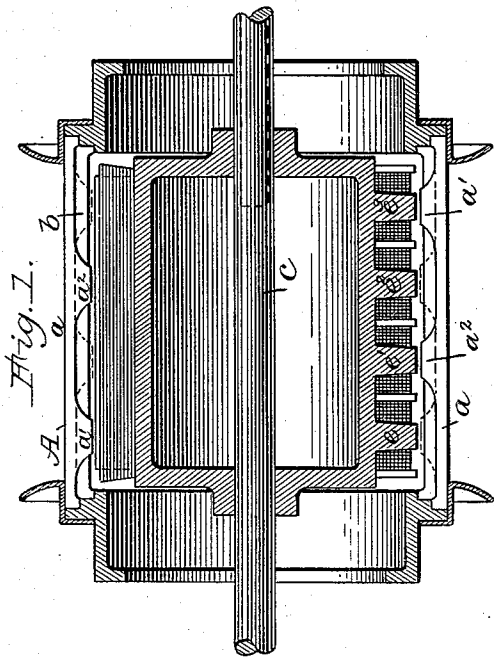
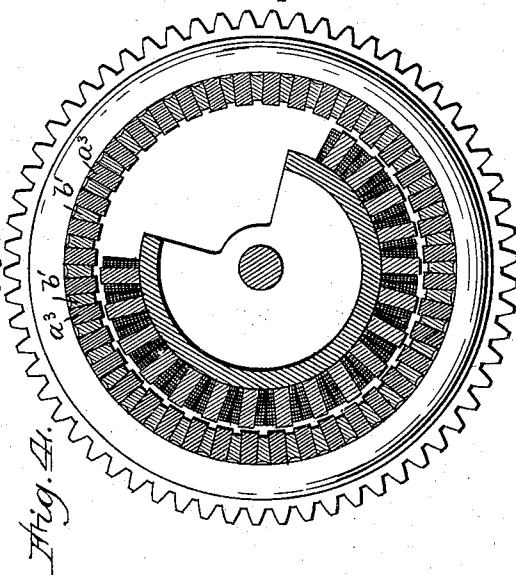
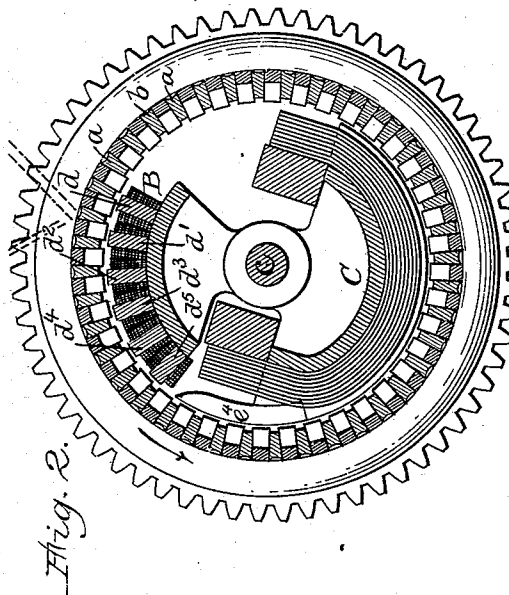
R. EICKEMEYER, Dec'd.

R. EICKEMEYER, JR., Executor.

MAGNETIC SEPARATOR.

No. 567,382.

Patented Sept. 8, 1896.



Attest:
Philip F. Larner.
Howell Barth

Inventor:
Rudolf Eickemeyer.
By *M. C. Wood*
Attorney.

UNITED STATES PATENT OFFICE.

RUDOLF EICKEMEYER, OF YONKERS, NEW YORK; RUDOLF EICKEMEYER, JR., EXECUTOR OF SAID RUDOLF EICKEMEYER, DECEASED.

MAGNETIC SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 567,382, dated September 8, 1896.

Application filed January 28, 1890. Serial No. 338,399. (No model.)

To all whom it may concern:

Be it known that I, RUDOLF EICKEMEYER, of Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Magnetic Separators; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part thereof, is a clear, true, and complete description of my invention.

My said improvements pertain to that type of machines which embody a separating-drum provided with a series of longitudinal iron bars revolved around a stationary interior magnet, as disclosed in the United States patent to Wenstrom, November 15, 1887, No. 373,211. In all prior machines of this type the iron bars by which the iron to be separated is collected and carried alternate with each other as to polarity while passing the faces of the electromagnet, but the polarity of each bar during that time does not change. Such machines in operating upon a charge of mixed matter specially rich in particles of iron, or when the iron occasionally constitutes a considerable proportion of the immediate mass, the iron is so grouped or bunched upon the bars as to cause considerable quantities of non-magnetic matter to be embraced and carried by the bunched iron, thus in a measure defeating the end sought. I have now for the first time organized with the separating-drum and its collecting or separating bars an interior magnetic system, which so operates that the bars while moving in their collecting path are each intermittently and oppositely polarized, accompanied with an intervening neutral condition. In other words, during the performance of collecting and carrying duty each of the bars will be, for instance, polarized "N," and then be neutral, and then be polarized "S," and so on consecutively throughout the whole or any desired portion of their path to the position at which they are required to drop their loads. The effect of this magnetic system, with its intermittent shifting as to polarity, causes a corresponding frequent shifting of the relative positions of the particles and pieces of iron carried by the bars, which results in the release of such non-magnetic matter as would otherwise be carried with the iron. Inasmuch as the bunching of magnetic with non-mag-

netic matter is most liable to occur at or during the initial contact of the mixed mass of matter with the surface of the separating-drum, satisfactory results will accrue if the shifting of polarity be restricted to, say, sixty or eighty degrees of the circular path of the bars, the remaining portion of their collecting and carrying path being opposite and adjacent to magnetic pole-faces of another magnetic system, which will polarize each bar continuously, and yet cause the several bars to be oppositely polarized in alternation until they reach their discharging position.

After describing the machines illustrated in the accompanying drawings, the features deemed novel will be specified in the claim hereunto annexed.

Referring to the drawings, Figure 1 illustrates a portion of the separating-drum and the electromagnets in a machine embodying the several features of my invention, the drum portion being in longitudinal central section, the two forms of electromagnet being partially in section and partly in side view. Fig. 2 is a view of the same in central vertical cross-section, and it also shows one of the geared drumheads in side view. Fig. 3 illustrates in longitudinal section a drum of another construction and coöperating with but one form of electromagnet, shown partly in section and partly in side view. Fig. 4 is a central cross-section of the same, with a geared drumhead in side view.

Referring to Figs. 1 and 2, it is to be understood that the separating-drum A is provided with collecting or separating bars *a*, which are composed of soft iron, and have cheeks *a'* *a''*, and are exact counterparts, and they are reversed endwise alternately, all as disclosed in my application for patent, Serial No. 336,510. As usual, the bars *a* are separated by bars *b*, composed of non-magnetic metal, the adjacent supporting portion of the drum being also non-magnetic.

There are in this machine two separate magnetic systems fixed with relation to each other and supported upon and maintained in proper position by an axial supporting-bar *c*, which is hollow for a portion of its length to afford a passage for the wires connecting with the field-coils.

The upper magnetic system B consists of six iron cores or ribs *d* *d'* *d''* *d'''* *d''''* *d''''''*, arranged

lengthwise of the drum, and have their tops or faces located in close proximity to the inner surfaces of the cheeks a' a^2 of the bars, and each of these cores has its own field-coil, which incloses it longitudinally, said coils having no iron between them and the bars, and being so energized as to polarize said bars as well as the faces of the cores alternately, as, for instance, core d "N," core d' "S," core d^2 "N," and so on. These pole-faces are separated by spaces a little less than the combined width of one collecting-bar a and one non-magnetic bar b , and so that eight of the bars a will occupy the same arc of a circle which is occupied by the six pole-faces, as clearly indicated in Fig. 2. It will be seen that any one bar moving over these pole-faces will be first polarized "N," then neutralized, because midway between two pole-faces, then polarized "S," then neutral, then polarized "N," and so on until the last pole-face d has been passed, and it is obvious that during these shiftings or reversals in polarity that particles and pieces of iron carried upon and by said bars will be caused to correspondingly shift and change their positions and to cause the dislodgment of non-magnetic matter.

The lower magnetic system C consists of four segmental ribs or cores e e' e^2 e^3 , arranged with their convex pole-faces in close proximity to the inner surface of the cheeks of the collecting-bars, and each core is longitudinally inclosed by a field-coil of a novel character devised by me, and fully described in my aforesaid application for patent. It is deemed ample for the purposes of this specification to indicate that said coils at their ends are wound upon and around a set of supporting-pins, and that they are so energized as to, for instance, polarize the core e "N," core e' "S," core e^2 "N," and e^3 "S," so that while the cheeks of one-half of the bars will override cores e and e^2 and be continuously of one polarity the rest of the bars will have their cheeks overriding cores e' and e^3 and be continuously of an opposite polarity. At their upper ends these cores are each extended longitudinally, as at e^4 , Fig. 2, so as to occupy positions enabling them to promptly assume magnetic relations with the bars after the latter have passed the cores of the other set of magnets. It will be understood that dry free-running mixed matter containing the iron, is slowly delivered to the top of the drum, while the latter is revolving in the direction of the arrow, Fig. 2; and it will be obvious that the iron collected on the bars at the upper side of the drum cannot be so bunched as to hold and confine non-magnetic matter because of the frequent reversals and changes in the polarity of the bars and the consequent activity of the particles and pieces of iron, and when the already laden bars reach the second set of magnets a more or less further readjustment of the collected iron occurs, all of which is highly favorable to a complete elimination of all non-magnetic matter. In this machine the variable

polarity of the bars renders them less liable to permanent magnetism than when the bars are exposed to but one polarity, and so, also, do the bars more readily discharge their magnetism after leaving the lower magnet, and, therefore, the bars may be relied upon to perform a carrying duty far beyond the lower side of the drum, thus still further facilitating the discharge of non-magnetic matter before the bars reach the point at which they begin to release their loads. It will be understood that even while a bar is passing from one pole-face to the other at the magnetic system B there is no liability of its dropping whatever iron there may then be carried by it, and that this one system of magnetization may be employed to the exclusion of the other, as, for instance, as shown in Figs. 3 and 4. In this case the separating-drum A' is, as before described, with the exception of the carrying-bars, which are much simpler and less expensive than the others. These bars a^3 have no cheeks but are merely straight bars, rectangular in cross-section, and separated by similar bars b' of non-magnetic material.

In this machine the electro magnet or magnets B' occupy nearly two hundred and forty degrees of the circular path of the bars, and there are eighteen cores lengthwise of the drum, and each has its own field-coil directly underlying the collector-bars, and said cores alternate as to polarity, as in the magnetic system B previously described. Opposite these cores there is a portion of the drum containing twenty-seven bars, and each, as it travels, is intermittently reversed in its polarity from "N" to "S," with an intervening neutral condition, until it reaches its discharging position at the lower end of the magnetic system. Both of the machines shown are like that disclosed in my aforesaid application, in that neither of these electromagnets project any portion of its magnetic field in a direction opposite to the bars, which are, for the time being, to be magnetized; or, in other words, the magnetic field is so restricted that the heads of the drum cannot be magnetized, nor can the collecting-bars be affected while in the discharging portion of their circular path.

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

In a magnetic separator, the combination substantially as hereinbefore described, of a rotative separating-drum, provided with longitudinal separating-bars, and two internal stationary magnetic systems, one of which oppositely polarizes each bar intermittently while moving through a portion of its circular path, and the other, causes alternating bars to be oppositely polarized while moving through another portion of said path.

RUDOLF EICKEMEYER.

Witnesses:

R. EICKEMEYER, Jr.,
JOHN L. CLARK.