H. J. H. NATHORST.

MAGNETIC SEPARATOR.

APPLICATION FILED MAR. 5, 1913.

1,105,293. Patented July 28, 1914.

Fig. 1.

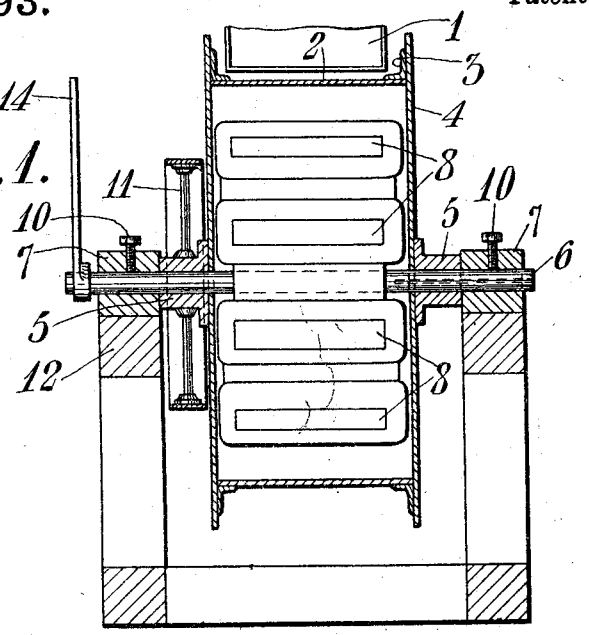
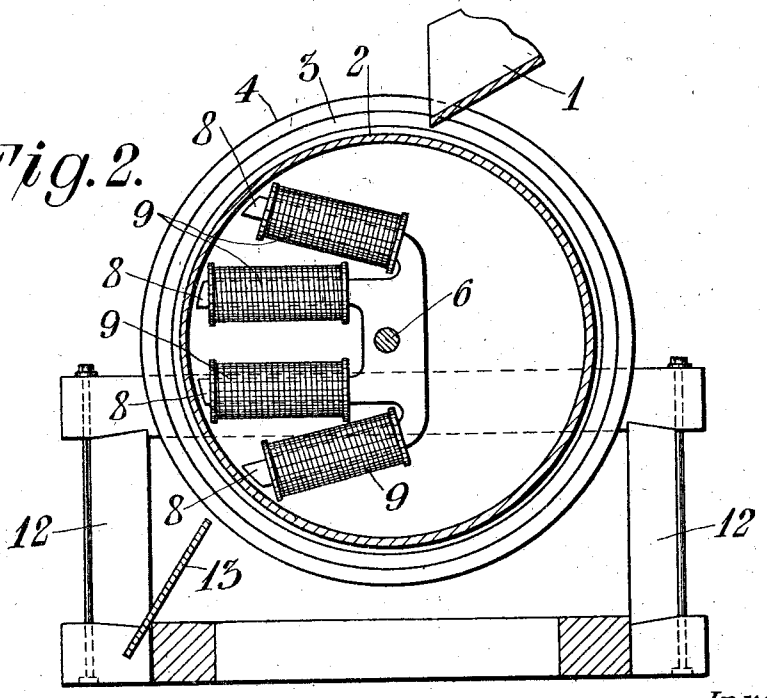


Fig. 2.



Witnesses.

K. E. Wiberg

Karl Runeskog

Inventor.

Harry Johan Hjalmar Nathorst

UNITED STATES PATENT OFFICE.

HARRY JOHAN HJALMAR NATHORST, OF MALMBERGET, SWEDEN.

MAGNETIC SEPARATOR.

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To all whom it may concern:

Be it known that I, HARRY JOHAN HJALMAR NATHORST, a subject of the King of Sweden, residing at Malmberget, in the Kingdom of Sweden, have invented new and useful Improvements in Magnetic Separators, of which the following is a specification, reference being had to the drawing accompanying and forming a part hereof.

My invention relates to improvements in magnetic separators such as are used for instance for separating magnetic iron ore from its accompanying rock.

The object of my invention is to produce a separator which shall be simple of construction and efficient in operation, which shall not require frequent repairs and be relatively cheap to manufacture.

In order to gain this object my invention consists mainly in the combination of a cylindrical drum arranged to be rotated, a plurality of magnets within the drum with their poles in close proximity to the interior wall of the drum, the polarity of the poles arranged to alternate in the direction of the rotation of the drum, and means for rotating the drum relatively to the magnets, the cylindrical part of the drum being formed from magnetic material for instance iron. By this arrangement I gain, contrary to what might be expected, the advantage of a higher magnetic efficiency than in separators previously known, because the iron drum will act in such manner as to strengthen the magnetic field.

My invention is illustrated in the accompanying drawing, in which—

Figure 1 is a longitudinal vertical section of the separator, and Fig. 2 is a vertical cross section.

Referring to the drawings in detail, 1 represents a chute for conveying the crushed material to the separator, and 2 represents a cylindrical drum formed from sheet iron of a thickness of about from 3 mm. to 6 mm. depending on the quality of the material to be treated by the machine. Two rings 3 of angle iron are riveted to the drum and bolted to the non-magnetic end pieces 4, which in turn are fastened by bolts or rivets to the hubs 5. The hubs 5 are loosely journaled on the shaft 6, so that the whole drum is arranged to rotate around the shaft 6 which rests in two bearings or pillow blocks 7. The magnets 8, shown on the drawing as four in number, are fastened to the shaft 6 and provided with windings 9 so arranged as to alternate the polarity of each two contiguous magnet poles. By means of the set screws 10 the shaft 6 together with the magnets 8 are retained in desired position which may be adjusted by the lever 14 after loosening the set screws. A pulley 11 fastened to one of the hubs 5 serves as means for rotating the drum in proper direction and with suitable speed. The bearings 7 rest upon a suitable bench 12 which thus supports the complete separator.

13 represents an adjustable separating board, on the opposite sides of which the magnetic and non-magnetic material will drop.

The iron drum will of course act so as to partly short-circuit the magnetic system but in actual practice it has been proved that the magnetic field will be strengthened by the iron drum to a higher degree than what corresponds to the losses caused by the short circuit, so that this separator will operate with a higher magnetic efficiency than separators equipped with a non-magnetic drum, or with drums equipped with iron bars. In order that the separator shall operate in the most perfect manner it is necessary that the cylindrical surface of the drum shall not be interrupted in any place for at such a place would ensue a polarity which would cause the magnetic material to adhere to the drum independently of the position of the drum relatively to the magnets. I therefore prefer to form the cylindrical part of the drum in one piece by rolling it or by welding it together, but the drum may also, if desired, consist of several parts fastened together in some other suitable manner.

This separator may of course be constructed with any other number of poles than shown on the drawing—however, not less than two. The poles must be so located that their polarity alternates in the direction of rotation of the drum. In some cases the drum may be constructed from some other magnetic material than iron.

Having thus described my invention, what I claim is:

1. In a magnetic separator, the combination of a cylindrical drum formed of a comparatively thick plate of magnetic material without interruptions and arranged to be rotated, a plurality of magnets within the drum with their poles in close proximity to the drum, the polarity of the poles arranged

to alternate in the direction of the rotation of the drum, together with means for rotating the drum relatively to the magnets.

2. In a magnetic separator, the combination of a cylindrical drum formed in one piece of a comparatively thick plate of magnetic material without interruptions and arranged to be rotated, a plurality of magnets within the drum with their poles in close proximity to the drum, the polarity of the poles arranged to alternate in the direction of the rotation of the drum, together with means for rotating the drum relatively to the magnets.

3. In a magnetic separator, the combination of a shaft, a cylindrical drum formed of a comparatively thick plate of magnetic material without interruptions and journaled and rotatable on the shaft, a plurality of magnets within the drum fastened to the shaft with their poles in close proximity to the drum, the polarity of said poles arranged to alternate in the direction of the rotation of the drum, a separating board outside of the drum, means applied to the shaft for shifting the position of the magnets relatively to the board, and means for rotating the drum,

HARRY JOHAN HJALMAR NATHORST.

Witnesses:
KARL RUNCSKOG,
K. E. WIBERG.