

1,114,071.

FIG. 1.

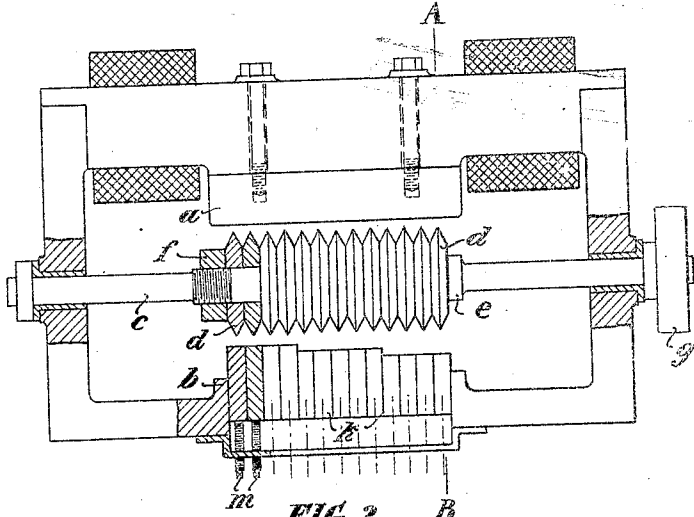
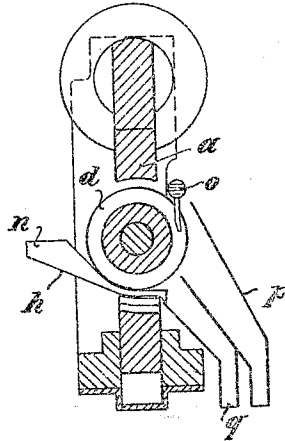


FIG. 2.



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MAGNETIC SEPARATOR.
APPLICATION FILED JULY 3, 1913.

Patented Oct. 20, 1914
2 SHEETS-SHEET 2.

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FIG. 3.

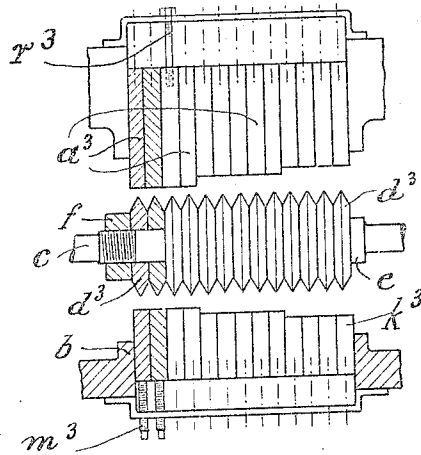


FIG. 4.

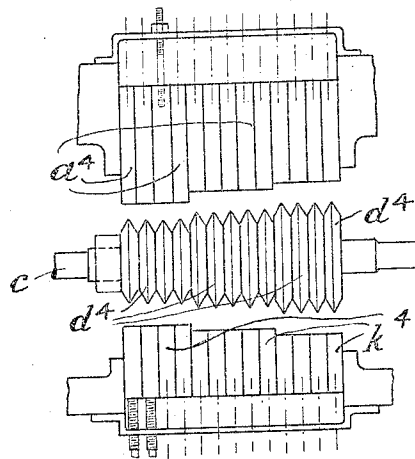
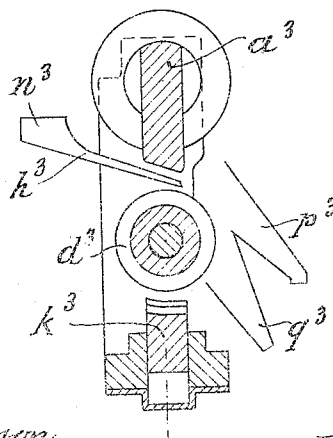


FIG. 5.



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MAGNETIC SEPARATOR

1,114,071.

Specification of Letters Patent.

Patented Oct. 20, 1914.

Application filed July 3, 1913. Serial No. 777,218.

To all whom it may concern:

Be it known that I, GEORG ULLRICH, a subject of the King of Bavaria, and resident of Magdeburg, German Empire, have invented certain new and useful Improvements Relating to Magnetic Separators, of which the following is a specification.

This invention relates to magnetic separators.

There are a number of small mining installations in which treatment has to be carried out upon ores that are obtained separately and that differ considerably in their magnetic properties and also in the rate at which they can be supplied from the mine. If a separate magnetic separator were provided for each grade of ore, none of the separators would be fully utilized as regards its magnetic structure because of the variable rate of supply of the ores.

The chief object of the present invention is to enable various kinds of ore to be treated simultaneously but separately from each other, in a magnetic separator common to all the ores.

The invention is particularly applicable to separators of the kind in which a horizontal rotatable cylinder composed of disks serves as armature to an underlying magnet pole, between which and the cylinder the material to be treated is made to travel transversely with respect to the axis of the cylinder.

According to the present invention the magnetic separator is so constructed that the complete magnetic field across which the material to be treated is conducted is subdivided into partial fields the strengths of which differ from one another.

In order to adapt the strengths of the several partial fields as far as possible to the different magnetic properties of the different kinds of ore, the widths of the gaps of the partial fields are adjustable independently of each other. By making the width of each individual field variable, provision is made for the variable rate of supply of the ores and for complete utilization of the magnetic structure.

The invention can be carried into practice in various ways and is applicable to separators of all kinds in which the path taken by the material during its introduction into the

field gap and the path taken by it during its discharge coincide.

In the accompanying drawing the invention is illustrated by way of example as applied to a cylinder separator.

Figure 1 is a sectional elevation, and Fig. 2 is a cross section on the line A—B of Fig. 1 illustrating one embodiment of this invention; Fig. 3 shows an elevation partly in section, of a second embodiment; Fig. 4 an elevation of a third embodiment and Fig. 5 a cross section of Fig. 3.

a Figs. 1 and 2 is the upper pole of the separator and *b* is the lower pole. Between these two poles is mounted the cylinder, consisting of a plurality of disks *d* which are arranged in series upon a shaft *c* and are preferably tapered at their peripheries. The disks *d* are secured in position upon the shaft *c* by means of a collar *e* and a nut *f*. The shaft *c* is rotated in any convenient way, as for example by a belt pulley *g*. Between the disks *d* of the cylinder and the lower pole *b* the feed device for the material to be treated is situated. Now in order to permit of the simultaneous treatment of ores presenting differing magnetic properties and of which the supply is variable, the lower pole, Fig. 1, or both poles, Fig. 3, are divided into interchangeable pole pieces located side by side parallel with the feed of the material. In the examples illustrated the number and the thickness of the lamellæ *k* and *a*, *k*², respectively are equal to the number and thickness of the disks *d*, so that a lamella is opposite each disk. The lamellæ are adjustable in the vertical direction for the purpose of modifying the field gap width; this adjustment can be effected by means of screw bolts *m*, and *m*², *r*² respectively for example. The lamellæ can be combined into groups of different width; that is the groups may differ as regards the number of the disks composing them. In the drawings three such groups are illustrated.

The material to be treated is supplied to each group of lamellæ at *n* of the feeding device *h*, Fig. 2. In the several partial fields of the complete magnetic field, the magnetic material is attracted onto the sharp edges of the rotating disks *d* which carry it outside the field, and finally, in as far as it does

not fall of itself, it is mechanically removed, by means of spraying devices as indicated at *o* for example. The magnetic material is conducted away through a chute *p* and the

5 non-magnetic material through a chute *q*.

Instead of the cylinder for attracting and removing the magnetic material, some other convenient delivery means might be adopted such as a series of groups of cylinders *u*⁴.
 10 Fig. 4. The formation of partial fields of different strength and width can also be effected by stepping the cylinder Fig. 4, for example by making the disks *d*⁴ of different diameters and interchangeable. As before, the lamellæ *a*⁴ and *h*⁴ of the upper and lower
 15 poles are here arranged in stepped groups. Furthermore the arrangement of pole lamellæ can be combined with the provision of disks of different diameters. In the example illustrated in Figs. 1 and 2 the material
 20 is conducted between the cylinder and the lower pole *b*. It might, however be conducted by means of a feeding device *n*⁵ *h*⁵ between the cylinder *d*⁵ and the upper pole, *a*⁵, as illustrated in Fig. 5, in which case it
 25 would be preferable to effect the subdivision of the magnetic field into partial fields by suitably designing and adjusting the upper pole *a*⁵. The chutes *p*⁵ and *q*⁵, for conducting
 30 the separated magnetic and unmagnetic material respectively, will then have to be located somewhat higher on the separator.

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

1. A magnetic separator having poles, one of which comprises lamellæ parallel with the direction of feed across the field, and
 40 means for individually adjusting the lamellæ, and having the magnetic field across which the material to be separated is conducted, subdivided into partial fields, each partial field being adjustable, and means for
 45 conducting the material to be separated through the field gap.

2. A magnetic separator having its magnetic field subdivided into partial fields, said partial fields comprising interchangeable lamellæ for each pole arranged side by side
 50 parallel with the direction of travel of the material across the field, said lamellæ being adjustable for regulating the width and the gap of said partial fields; and means for
 55 conducting material to be separated through the field gap.

3. A magnetic separator having its magnetic field subdivided into partial fields, comprising a stepped cylinder by which the magnetic material is attracted, said cylinder
 60 revolving in the direction of travel of the material to be separated, a lower pole stepped to conform with said cylinder, and means for feeding the material to be separated into the gap between the cylinder and
 65 the pole.

4. A magnetic separator having its magnetic field subdivided into partial fields, comprising a stepped cylinder by which the magnetic material is attracted, said cylinder
 70 revolving in the direction of travel of the material to be separated, a pole stepped to conform with said cylinder, and means for feeding the material to be separated into the gap between the cylinder and the pole.
 75

5. A magnetic separator having its magnetic field subdivided into partial fields, comprising a stepped cylinder by which the magnetic material is attracted, said cylinder
 80 revolving in the direction of travel of the material to be separated, and upper and lower poles stepped to conform with said cylinder, and means for feeding the material to be separated into the gap between the cylinder and one of the poles.
 85

The foregoing specification signed at Magdeburg this 14th day of June 1913.

GEORG ULLRICH.

In presence of two witnesses—

WILHELM FLEISCHBACK,

HENNANN STEPHAM.