No. 698,311. Patented Apr. 22, 1902.

J. H. A. McPHEE.

MAGNETIC SEPARATOR.

(Application filed Dec. 3, 1901.)

(No Model.)

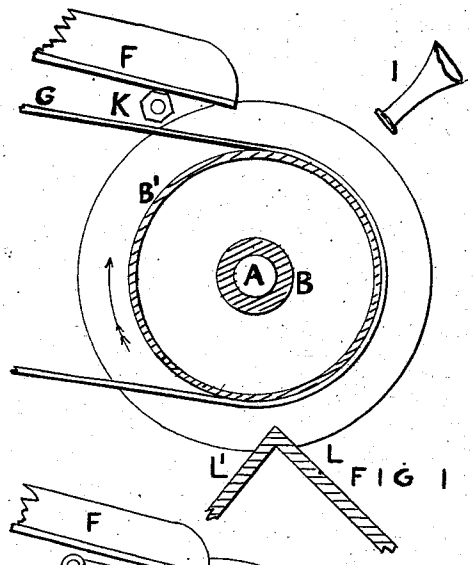


FIG 1

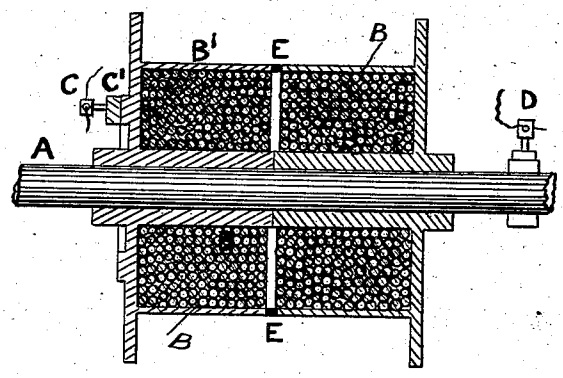


FIG 2

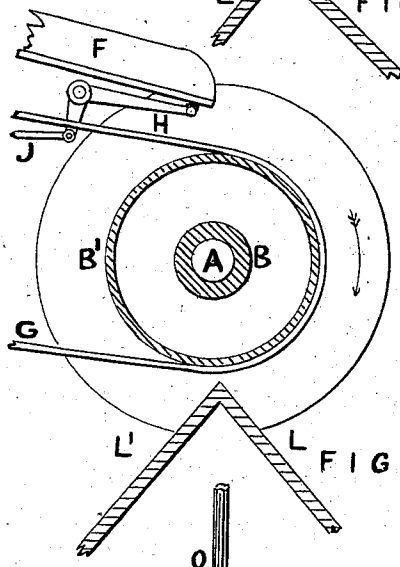


FIG 3

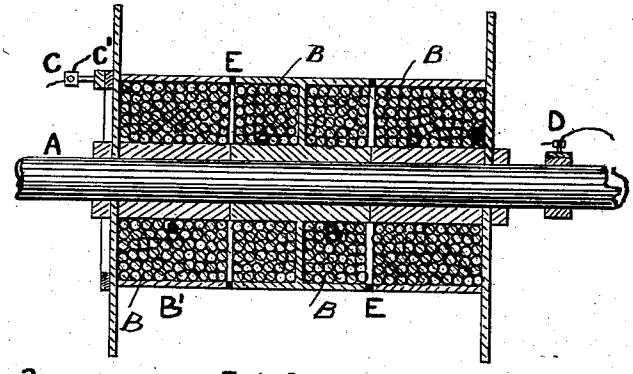


FIG 4

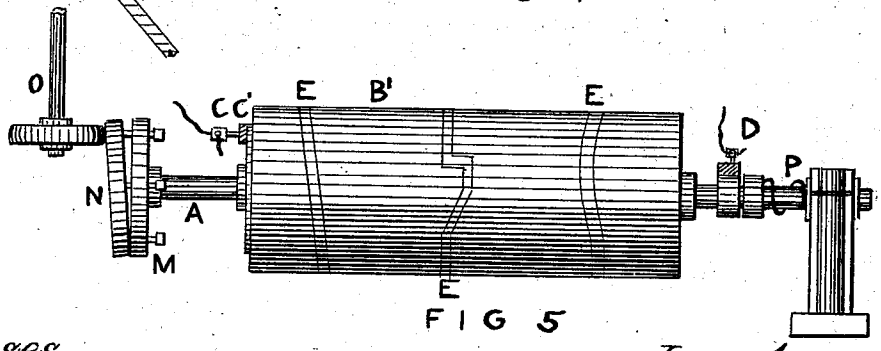


FIG 5

Witnesses.

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UNITED STATES PATENT OFFICE.

JOHN HUGH ALEX. McPHEE, OF DUNEDIN, NEW ZEALAND.

MAGNETIC SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 698,311, dated April 22, 1902.

Application filed December 3, 1901. Serial No. 84,558. (No model.)

To all whom it may concern:

Be it known that I, JOHN HUGH ALEXANDER McPHEE, (B. A.,) teacher, a subject of the King of Great Britain, residing at 49 Moray Place, in the city of Dunedin, in the British Colony of New Zealand, have invented a certain new and useful Improvement in Magnetic Separators, of which the following is a specification.

The object of this invention is to provide efficient means for separating out of gold and wash the heavy particles of iron-sand in a cheap and rapid manner by an appliance that will also separate magnetic from non-magnetic materials. For this purpose a pulley is magnetized by an electric current, preferably by using the bosses as cores and winding these with insulated electric wire capable of conducting a current of electricity, so as to convert the rim of the said pulley into an electromagnet. The rim is usually divided, and the portions of same are insulated, the whole of the sections being magnetized. The wash, mixed with the magnetic sand or other magnetic material, is passed over the pulley in a thin stream, preferably by being placed on a belt which works to another pulley, from which usually the power comes from the motor used and which is preferably run at a quicker speed than the advancing stream of wash. As the mixed material passes the pulley the material affected by the magnetism is retained, while the rest falls off by gravitation, assisted by the centrifugal force of the revolving pulley, into one compartment, while the material affected by the magnetism is carried farther and finally deposited in another compartment by the belt on leaving the pulley, tearing it out of the sphere of the magnetism. This separation can be helped by there being a current or jet of water or of air playing or blowing on the mixed material at about the point of separation. In any case the magnetic and non-magnetic portions of the mixed material or wash treated fall into different places, each to be treated as desired.

Referring to the accompanying drawings, Figure 1 is a section of a pulley that can be magnetized according to my invention, and Fig. 2 is a longitudinal section of the same with the belt omitted. Fig. 3 is an end section of the pulley, showing a slight modification in the shaking of the feeding-chute and a wider pulley; and Fig. 4 is a longitudinal section of the same. Fig. 5 is an elevation of a slight modification of the insulating and with an end motion given to the pulley.

A is the shaft, and B B the bosses of the pulley, on which the insulated electric wires are wound, filling the spaces between the bosses B and the rims B′, or nearly so.

C is the electric wire from the electric generator, and it may be noted that as the current is continuous it will not interfere with other electric arrangements that may be in the same circuit.

C′ is a usual ring-brush or other usual electric connection.

D is the return-wire and connections.

E E are insulating-strips dividing the rims into the desired number of portions.

F F are chutes for feeding the mixed material to the belt and pulley in a thin stream, and the chute may be shaken or beaten either up and down, as shown, or sidewise to facilitate an even thin stream of material. Such devices as shown in a cam K or a beater or shaker H, driven by a rod J, may be used for this purpose.

The mixed material coming through the chute F pours on the belt G any required distance from or close to the rim of the pulley B′, when the portion unaffected by the magnetism falls off into the bin L and the portion affected by the magnetism is carried to the bin L′, only falling off when the belt G is leaving the pulley in the usual course when the magnetic material is torn away from the magnetic influence by the belt.

I is a water or air jet location.

As mentioned, a current of air or water playing on the belt when on the pulley or about the point of separation of the magnetic and non-magnetic materials may be used. The action of this would wash or blow out particles that might be entangled with particles of material adhering and so not fall away as and when needed.

If, as well as the chute, the pulley is wanted to be shaken, such side motion can be given to it by such means as the cam and face-plate shown in Fig. 5, where M is a concentric face-

plate and N an adjustable eccentric one working up to the wheel O and kept to it by such means as the collar and adjustable spring P. Grooves of different shapes are shown, which would have a corresponding face at N. The pulleys could also be polygonal instead of round for this same shaking motion.

The pulleys may be either flanged or plain, and the flanges may be of non-magnetic material, if desired.

I have tried winding the arms of pulleys, using them instead of the bosses for the cores, and also an automatic arrangement of demagnetizing and remagnetizing pulleys where the insulation was across the rim at about right angles to the insulation of the rims shown; but I believe the method of winding the bosses of the pulleys as herein set forth to be the simplest and most effective way for practical working of my invention.

In this invention any suitable sizes or materials or strength of the electric current may be adopted.

Having now described my invention, what I claim, and desire to obtain by a patent of the United States of America, is—

A magnetic separator, a pulley consisting of a core and a shell surrounding the same and integral therewith, a magnetic coil wound upon said core and extending substantially to the inner face of said shell, a shaft extending through said core for supporting and rotating the pulley, suitable electrical connections for said coil, insulated means for dividing the pulley in sections, a belt operated by said pulley and adapted to receive and separate the material, means for supplying the material to the belt, and means for operating said pulley in a rotary direction and to impart a transverse movement to the pulley while it is rotating.

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

JNO. HUGH ALEX. McPHEE.

Witnesses:

HENTON MACAULAY DAVEY,

ELIZABETH ANN DAVEY.