C. T. HENDERSON.

ELECTROMAGNETIC SEPARATOR.

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1,166,682. Patented Jan. 4, 1916.

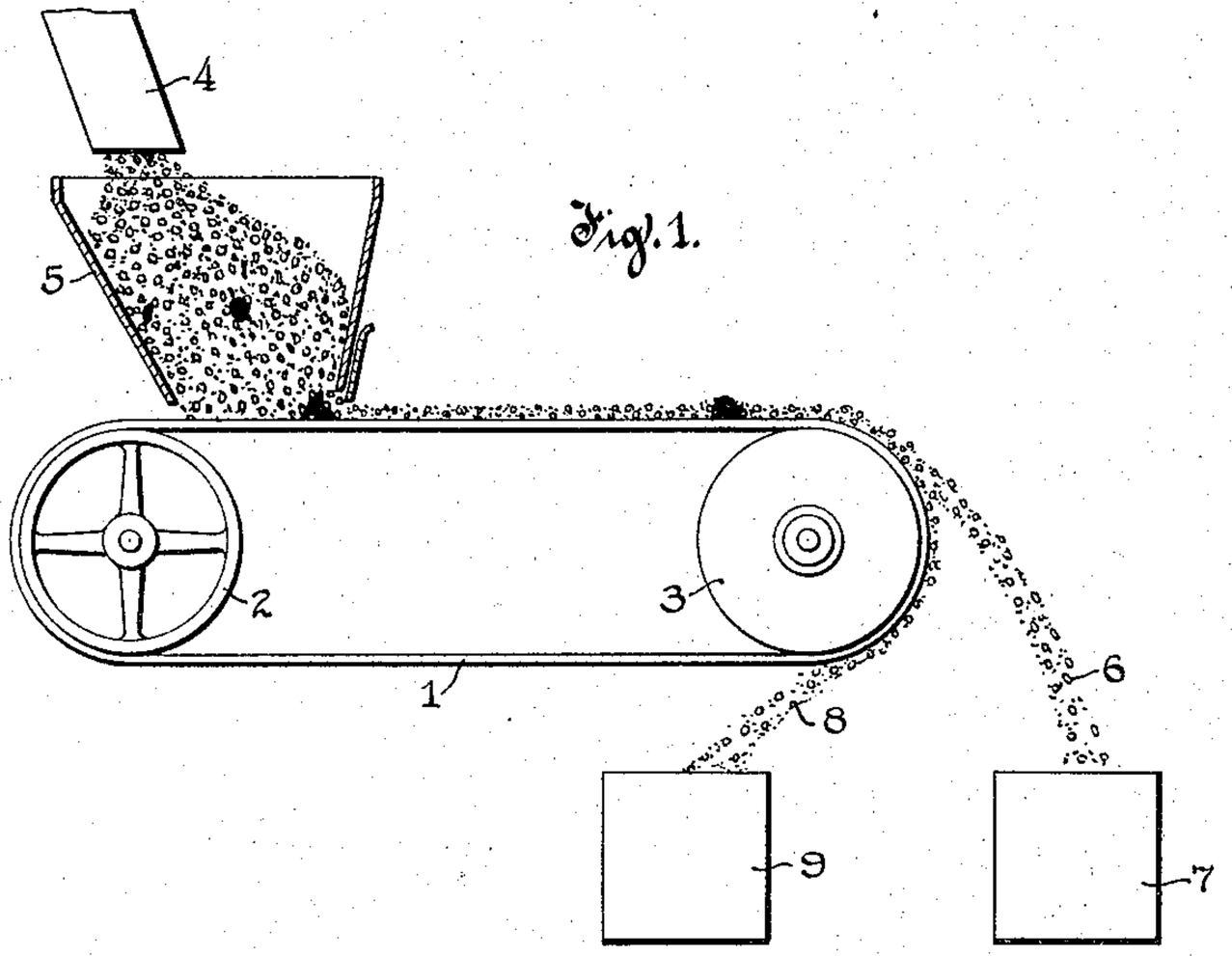
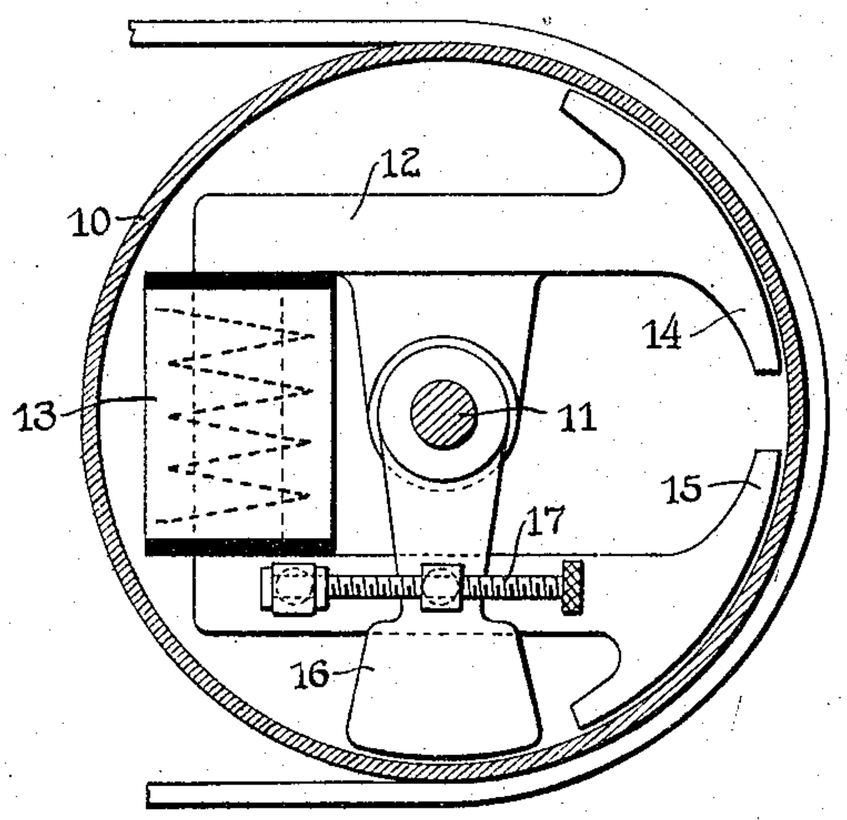


Fig. 1.

Fig. 2.



Witnesses

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ELECTROMAGNETIC SEPARATOR.

1,166,682. Specification of Letters Patent. Patented Jan. 4, 1916.

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To all whom it may concern:

Be it known that I, CLARK T. HENDERSON, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Electromagnetic Separators, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

This invention relates to improvements in magnetic separators and more particularly to those of the magnetic pulley type.

In practice, the magnetic pulleys of such separators are commonly provided with electromagnets to produce a magnetic field through which the conveyed material is passed and the electromagnet is so designed and positioned as to concentrate the magnetic field at a predetermined point in the travel of the conveyed material, namely, that at which the material tends to leave the conveyer belt. This arrangement is generally effective but under certain conditions, as where heavy pieces of magnetic content are encountered, the separation effected is unsatisfactory.

It is accordingly one of the objects of this invention to provide an improved magnetic separator pulley which will obviate the above difficulties and others.

Further objects and advantages will appear hereinafter in connection with the description of the accompanying drawing which shows a typical embodiment of the invention.

In the drawing, Figure 1 is a diagrammatic view of a magnetic separator pulley in operation and Fig. 2 is a diagrammatic sectional view of the separator pulley.

As shown in Fig. 1, the separator comprises a suitable conveyer belt 1 passing over a power pulley 2 and a magnetic pulley 3. The bulk material acted upon is conveyed from a suitable source such as the chute 4 into a guide 5 and on to the belt 1. As the material passes over the discharge end of the conveyer, the non-magnetic material 6 is projected forwardly to a suitable receptacle 7. As above mentioned, however, the magnetic material 8 contained in the mass is retained against the belt 1 until the same passes out of the magnetic field so that it is deflected from its normal path and is deposited in a separate receptacle 9.

Referring more specifically to Fig. 2, the separator pulley comprises a wheel or shell 10 rotatably mounted on a supporting shaft 11 and an inclosed magnet 12 which is also loosely mounted on said shaft, and independent of the shell. The electromagnet includes a winding 13 which may be connected to an energizing circuit in any desired manner, and pole pieces 14 and 15, normally disposed substantially horizontally so that the point of maximum field density of the magnet substantially coincides with the point in the travel of the material acted upon at which the material tends to leave the belt. This arrangement accordingly tends to insure retention of the magnetic content of the mass until after the non-magnetic content has been discharged. Moreover, the magnet 12 is pivotally mounted on the shaft 11 and is provided with a depending weight 16 which normally balances the magnet horizontally, but which permits rocking movement of the latter as will hereinafter appear. There is also preferably provided a threaded pin 17 between the weight 16 and frame 12 for adjusting the relative angle between said parts so that the magnet may be balanced at any desired angle to vary the normal position of the pole pieces 14, 15 and thus shift the point of maximum attraction of the magnet.

With the structure described, the position of the magnetic frame tends to remain substantially constant during the separating operation. However, in the event that a heavy or dense mass of magnetic material passes over the pulley the same will be caught in the concentrated magnetic field between the magnet poles 14 and 15, and, due to the attendant substantial decrease in the gap therebetween, will tend to rotate the magnet with the pulley shell 10 and the belt. The magnet will thus be rocked on the shaft 11 so that the full magnetic strength is temporarily continued on the magnetic material and the pulley retains the same until the latter is carried off by the belt. After such discharge of the magnetic mass, the weight 16 again becomes effective to return the frame 12 to normal position. The maximum magnetic force of the pulley is thus automatically adjusted to compensate for variations in the character of the material acted upon. Furthermore, the manual adjustment of the magnet enables

the pole pieces thereof to be shifted so that the region of maximum field strength can be set in accordance with the belt speed and attendant variations in the point at which the momentum of the material tends to carry the same away from the pulley.

What claim as new and desire to secure by Letters Patent is:—

1. An electromagnetic separator pulley provided with movable pole pieces to be moved by magnetic attraction and having means biasing the same toward a definite position.

2. In an electromagnetic separator, in combination, a shaft, a pulley wheel rotatable thereon, an electromagnet supported on said shaft independently of said wheel and having free pivotal movement, and a counter-weight associated with said electromagnet for balancing the same.

3. In an electromagnetic separator, in combination, a shaft, a pulley wheel rotatable thereon, an electromagnet supported on said shaft independently of said wheel and having free pivotal movement, a counter-weight associated with said electromagnet to balance the same, and means to shift said counter-weight relatively to said electromagnet for varying the balanced position of the latter.

4. An electromagnetic separator pulley having freely shiftable parts effecting increased magnetic field in a defined region normally circumferentially stationary, said parts automatically shifting to compensate for variations in the character of the magnetic material acted upon.

5. An electromagnetic separator pulley having freely shiftable parts effecting a dense magnetic field in a normally fixed region, said parts automatically shifting to compensate for temporary variations of a predetermined character in the magnetic material acted upon, and means to adjust said parts at will to compensate for continued variations of a predetermined character in the magnetic material acted upon.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

CLARK T. HENDERSON.

Witnesses:
TEKLA BAST,
L. A. WATSON.