L. I. BLAKE & L. N. MORSCHER.

ELECTROSTATIC SEPARATING PROCESS.

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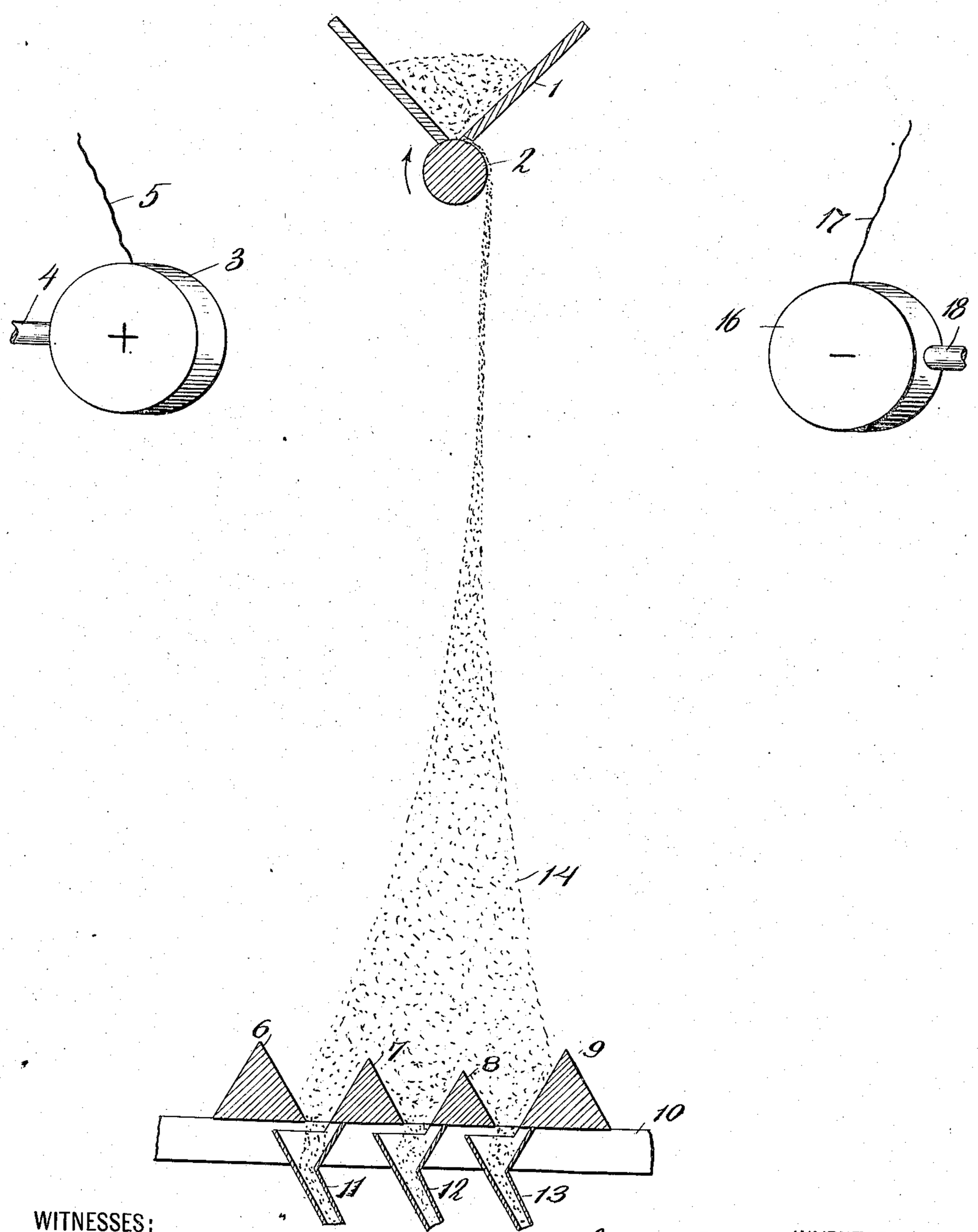
Patented June 8, 1909.



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ELECTROSTATIC SEPARATING PROCESS.

No. 924,032. Specification of Letters Patent. Patented June 8, 1909.

Application filed March 17, 1906. Serial No. 306,497.

To all whom it may concern:

Be it known that we, LUCIEN I. BLAKE, of Lawrence, in the county of Douglas and State of Kansas, and LAWRENCE N. MORSCHER, of Neodesha, county of Wilson, and State of Kansas, have invented certain new and useful Improvements in Electrostatic Separating Processes, of which the following is a specification, taken in connection with the accompanying drawing, which forms a part of the same.

This invention relates to electrostatic separating processes and relates especially to separating processes using comparatively weak electrostatic charges in which the particles of different composition receive different initial electrostatic charges due to contact or similar action.

The accompanying drawing shows in vertical section in a diagrammatic way an illustrative embodiment of apparatus for carrying out this process.

As indicated in the illustrative drawing showing diagrammatically apparatus for carrying out this process, the material to be separated, such as particles of ore, may be fed from the hopper 1 by any suitable feeding device by which they are projected through a fluid medium preferably while in a separated condition. The feeding device may be in the form of a roll 2 rotating in the direction indicated by the arrow so as to feed a substantially constant stream of particles from the roll which are allowed to fall in substantially separated condition through the air or other fluid medium as indicated. The electrode 3 is indicated as having a cylindrical form, preferably with rounded ends and is supported on the insulating stem 4. As indicated this electrode may be supplied with positive static electricity, preferably of comparatively low voltage, such as 5000 or 10,000 volts, for instance, by a wire 5. If desired, a similar electrode 16 may be supported by the stem 18 opposite the electrode 3 and symmetrical with respect to the stream of material and may be supplied with negative static electricity, preferably of the same intensity, by the wire 17. It is, of course, apparent that the exact arrangement of these electrodes may be varied, although good results have been secured by mounting the electrodes slightly below the feed roll so that they act upon the stream of falling material as it leaves the roll or other feeding device and when its velocity is comparatively small. With two symmetrically arranged electrodes of the same size and charged with static electricity of the same intensity and opposite potential the inductive action is minimized and deflection of the falling particles due to this cause consequently reduced. It is not necessary, furthermore, to employ two such electrodes since good separation may be obtained under some circumstances by the use of a single electrode. A number of dividers 6, 7, 8 and 9 are indicated as adjustably mounted on the support 10 and the divider 7 is provided with the attached chute 11 to guide the material and in a similar way the divider 8 carries the chute 12 and the divider 9 carries the chute 13.

The particles of ore of different composition come in contact with each other in the hopper and in passing over the feed roll and seem to have when they fall from the feeding device definite electrostatic charges of opposite potential, the particles of one composition having charges of one potential and those of another composition or character having static charges of opposite potential. In falling past the charged electrodes the particles having an initial minus charge are naturally attracted toward the positive electrode and deflected in that direction. The particles having a positive charge are repelled by the positive electrode and attracted by the negative electrode if one is employed so as to be deflected in the opposite direction, the lower end of the stream 14 of these falling particles being thus spread out, the particles of different material falling in this way between the various dividers and a separation taking place. The initial charges on the particles seem to be dependent on contact or some similar action and appear to be of different polarity, since by reversing the polarity of the fixed electrodes the direction in which particles of one material are deflected is reversed. The importance of these initial charges on the particles in effecting a greater separating action is more apparent when a comparatively weak electrostatic field is used, that is, when the electrodes are charged at only a moderate potential; the use of two symmetrically arranged oppositely charged electrodes as illustrated also tends to neutralize the effects of induction in

deflecting the particles due to the charges that they receive inductively from the electrodes.

Having described this process in connection with an illustrative mode of carrying the same into effect, to the details of which we do not desire to be limited, what we claim as new and what we desire to secure by Letters Patent is set forth in the appended claims.

1. The electrostatic separating process which consists in feeding particles of material in contact with one another in a substantially neutral electrostatic field to produce a stream of falling particles having diverse initial mutual contact charges dependent upon their composition and in producing a comparatively weak electrostatic field adjacent said falling particles to deflect them in proportion to said initial contact charges.

2. The electrostatic separating process which consists in feeding particles of material in contact with one another in a substantially neutral electrostatic field to produce diverse initial mutual contact charges upon said particles dependent upon their composition and in projecting said particles through a fluid medium and through an electrostatic field to deflect said particles according to their initial charges.

3. The electrostatic separating process which consists in bringing particles into contact and allowing them to become diversely electrified by their mutual contact charges dependent upon their composition in projecting said particles through a fluid medium in substantially separated condition and in acting on said moving particles by an electrostatic field having comparatively weak inductive action to deflect said particles according to their composition.

4. The electrostatic separating process which consists in bringing particles into contact and giving them diverse initial electrostatic charges dependent upon their composition in projecting said particles through a fluid medium and in acting on said particles by an electrostatic field to deflect said particles in proportion to their composition and initial charges.

5. The electrostatic separating process which consists in bringing particles into contact with one another and giving them diverse initial electrostatic charges dependent upon their composition and allowing a stream of such particles to fall through a fluid medium between substantially symmetrically placed and oppositely charged electrodes to deflect said particles.

6. The electrostatic separating process which consists in bringing particles of material into contact and allowing them to become diversely electrified by mutual contact charges dependent upon their composition and in projecting said particles through an electrified fluid medium to deflect said particles according to their composition and contact charges.

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