

No. 827,115.

PATENTED JULY 31, 1906.

G. W. PICKARD.
METHOD OF ELECTROSTATIC SEPARATION.

APPLICATION FILED SEPT. 27, 1906.

2 SHEETS—SHEET 1.

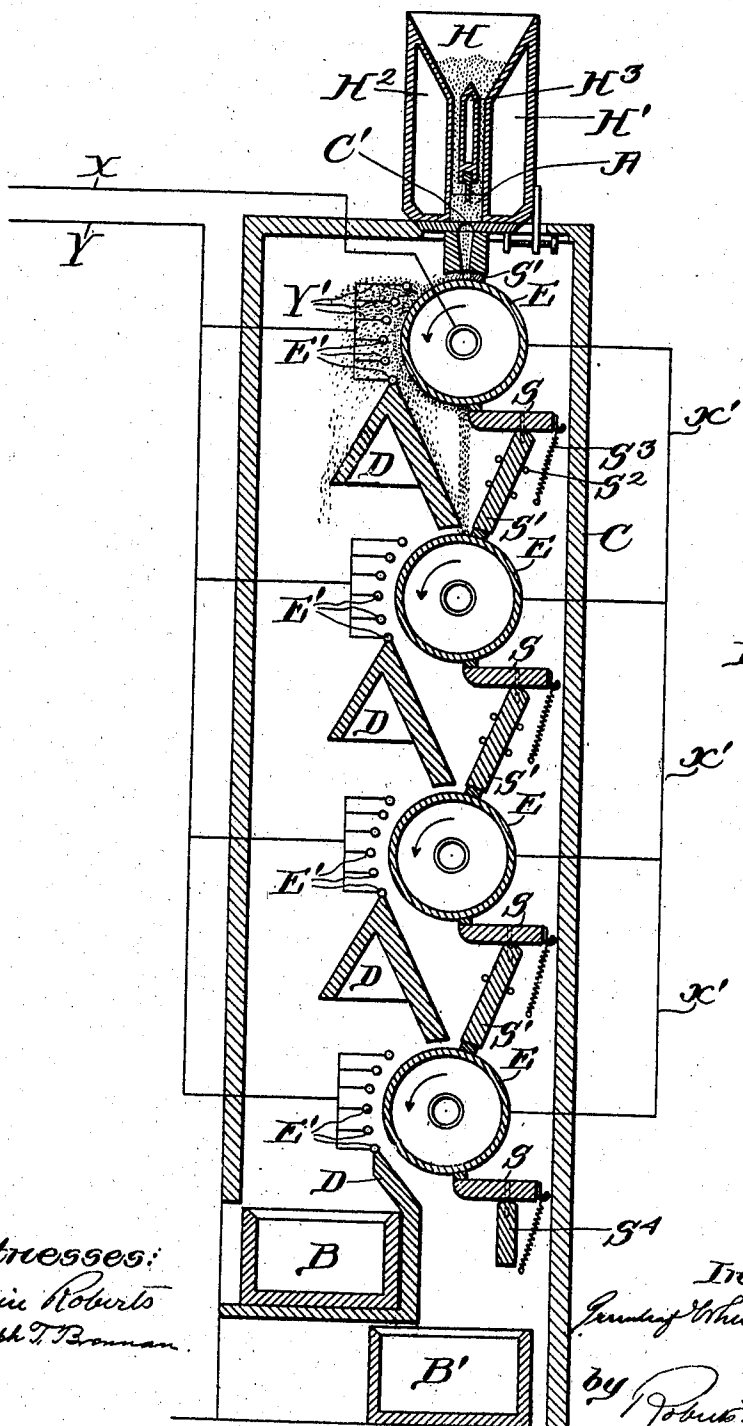


Fig. 1.

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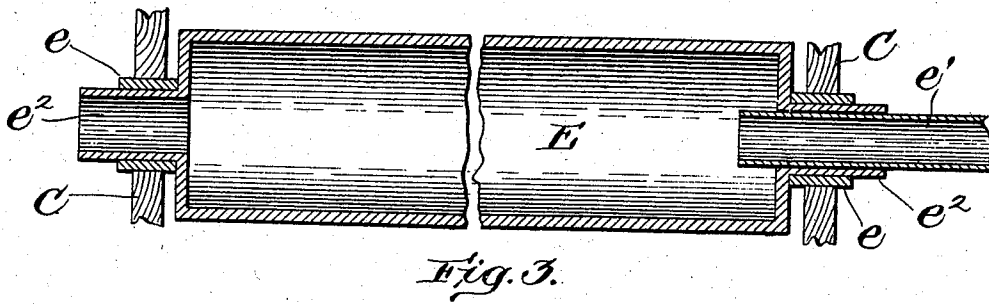
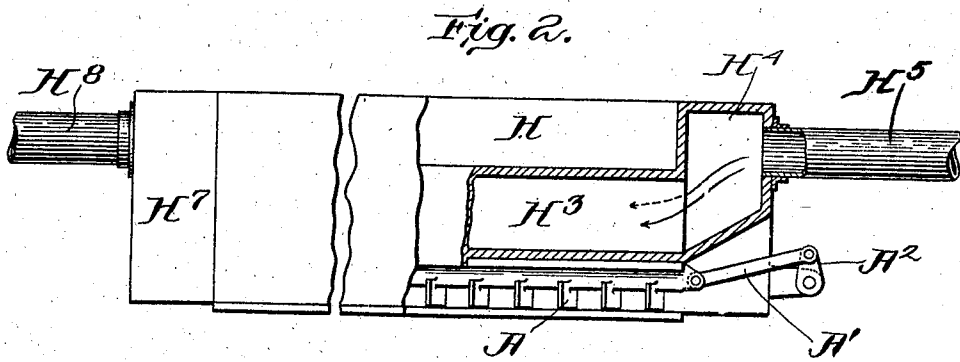
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

GREENLEAF WHITTIER PICKARD, OF AMESBURY, MASSACHUSETTS,
ASSIGNOR, BY MESNE ASSIGNMENTS, TO HUFF ELECTROSTATIC
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METHOD OF ELECTROSTATIC SEPARATION.

No. 827,115.

Specification of Letters Patent.

Patented July 31, 1906.

Application filed September 27, 1905. Serial No. 280,322.

To all whom it may concern:

Be it known that I, GREENLEAF WHITTIER PICKARD, a citizen of the United States, and a resident of Amesbury, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Methods of Electrostatic Separation, of which the following is a specification.

My invention relates to the art of electrostatic separation or concentration of mixed comminuted materials; and it consists of improvements in the method of electrostatic separation whereby the separator is given increased efficiency and is enabled to operate successfully over a much larger range of materials than heretofore.

In order to a full understanding of my improved method, I here describe an apparatus, shown in the annexed drawings, by which my improved method may effectively be carried out. In an application for patent filed concurrently herewith, Serial No. 280,323, filed September 27, 1905, I have claimed this apparatus and its structural combinations.

In the drawings hereto annexed, Figure 1 is a vertical cross-section of an apparatus by which my method is carried out. Fig. 2 is a vertical longitudinal section of a portion of the hopper for feeding material, and Fig. 3 is a detail showing in longitudinal section one of the electrodes of the apparatus.

The separating devices consist of a vertically-arranged series of cylindrical metallic electrodes E, mounted upon bearings to rotate in the direction indicated by the arrows. These electrodes are connected, as shown conventionally, with one terminus of an exciting-machine, these wires being shown as X X'. The opposed electrodes E' are arranged in series, there being a plurality of such opposed electrodes for each of the main cylindrical electrodes E. These opposed electrodes E' are of much smaller superficial extent than the electrode E and consist, preferably, of quite fine metal wires inclosed in relatively thick glass tubes or envelops. These wires are connected, as by Y Y', with the other terminal of the exciting-machine. Below the electrodes E E' there are located the dividers D. These are secured in any suitable manner to the inside of the casing C. Upon the top of the casing C is mounted the hopper H, this hopper being constructed with longitudi-

nal heating-chambers H', H², and H³, the latter extending from end to end inside the hopper, so that the material must pass on either side of the heating-chamber H³ and next to the chamber H' on one side and H² on the other. Near the bottom of this hopper there is mounted the agitator A, which, as shown in Fig. 2, is operated by a crank and connecting-rod and serves to scrape and sift the comminuted material through the slot C', so that it will fall in a regular stream upon the surface of the upper electrode E. Upon the end of the hopper H there is formed the chamber H⁴, and upon the opposite end a similar chamber H⁵ is provided. A pipe H⁶ serves to conduct heated gases, such as steam or hot air, into the chambers H' H² H³, so that the material falling through the hopper H will become thoroughly and effectively heated in its passage over the surfaces of the heating-chambers. A vent H⁸ at the chamber H⁷ at the opposite end serves to conduct the hot gases away to any desired point. The electrodes E are mounted on bearings e in the ends of the chamber C, and tubular trunnions e², secured to the electrodes E, serve to carry the electrodes and also as openings where-through to induct heated gases to the interior of the electrodes E. Nozzles e' are provided for this purpose. The bearings for the electrodes are shown at e. At the opposite end the hollow trunnions e² serve to allow the gases to escape from inside the electrode.

It has been recognized from the initiation of the art of electrostatic separation that the processes are assisted materially by presenting the substances to be treated in a perfectly dry state, and consequently it has been the practice for a long time to heat materials before they are fed to the electrodes of an electrostatic separator, this heating serving to facilitate the separation of many materials. I have discovered, however, that if a heated atmosphere be maintained also near and around the electrodes themselves, especially if the electrodes themselves are heated so that the atmosphere is hottest at the surface of the electrodes, the resulting separations are far more thorough than under any other condition observed by me, and, moreover, many mixtures of material which, as far as I am aware, have heretofore resisted effectual separation by the electrostatic

method are by this improvement completely and easily separated.

The value of the plurality of electrodes E' resides in their successful operation upon the material as it passes over or along the surface of the larger electrode E. There is a concentration of field in close proximity to each one of the smaller electrodes, and while the great bulk of separation apparently takes place when the material is passing between the electrode E and the first of the smaller electrodes e' nevertheless separation continues thereafter, the successive small electrodes searching out the conductive particles from the mass and gleaning, as it were, after the separation effected at the first opposed electrode. If the desired separation cannot be completed by a single set of electrodes E E', the material which has not been repelled from the upper electrode E is conducted by the sloping side of the divider D to a second electrode E, and so on, the electrical conditions at all the electrodes usually being preferably the same, the electrodes E being connected to one terminus of the exciting apparatus and the electrodes E' to the other. At the close of this operation the heads are collected in a proper receptacle, such as a box B, while the tails fall into another receptacle, as B'. As has been observed in connection with the operation of such electrostatic separation apparatus as that described in the Dolbear patent, No. 685,508, frequently some of the unrepelled particles cling to the rotating electrode E and are carried thereby and

might be carried around through a complete rotation of the electrode. Therefore I provide rubbers or scrapers S S' to clean the electrodes E at the bottom and top thereof, respectively. For simplicity of construction the rubbers S may be pivotally attached to the rubbers S', the latter being loosely guided, as by pins S², set into the ends of the casing C, a spring S³, attached to the rubber S, serving to hold both into contact with their respective electrodes.

The exciting apparatus which I prefer to employ in connection with this separator is such a one as described in the Letters Patent of the United States No. 796,011, dated August 1, 1905.

What I claim, and desire to secure by Letters Patent, is—

1. The method of electrostatic separation, which consists in heating the mixture to be separated, and thereafter subjecting it to electrostatic separative influence in a heated atmosphere and thereafter separately collecting the materials.

2. The method of electrostatic separation, which consists in heating the mixture to be separated, thereafter passing the material to an electrode, and heating the electrode and thereafter separately collecting the materials.

Signed by me at Boston, Massachusetts, this 23d day of September, 1905.

GREENLEAF WHITTIER PICKARD.

Witnesses:

ODIN ROBERTS,
JOSEPH T. BRENNAN.