No. 840,802. PATENTED JAN. 8, 1907.

G. W. PICKARD.

ELECTROSTATIC SEPARATOR.

APPLICATION FILED JAN. 29, 1906.

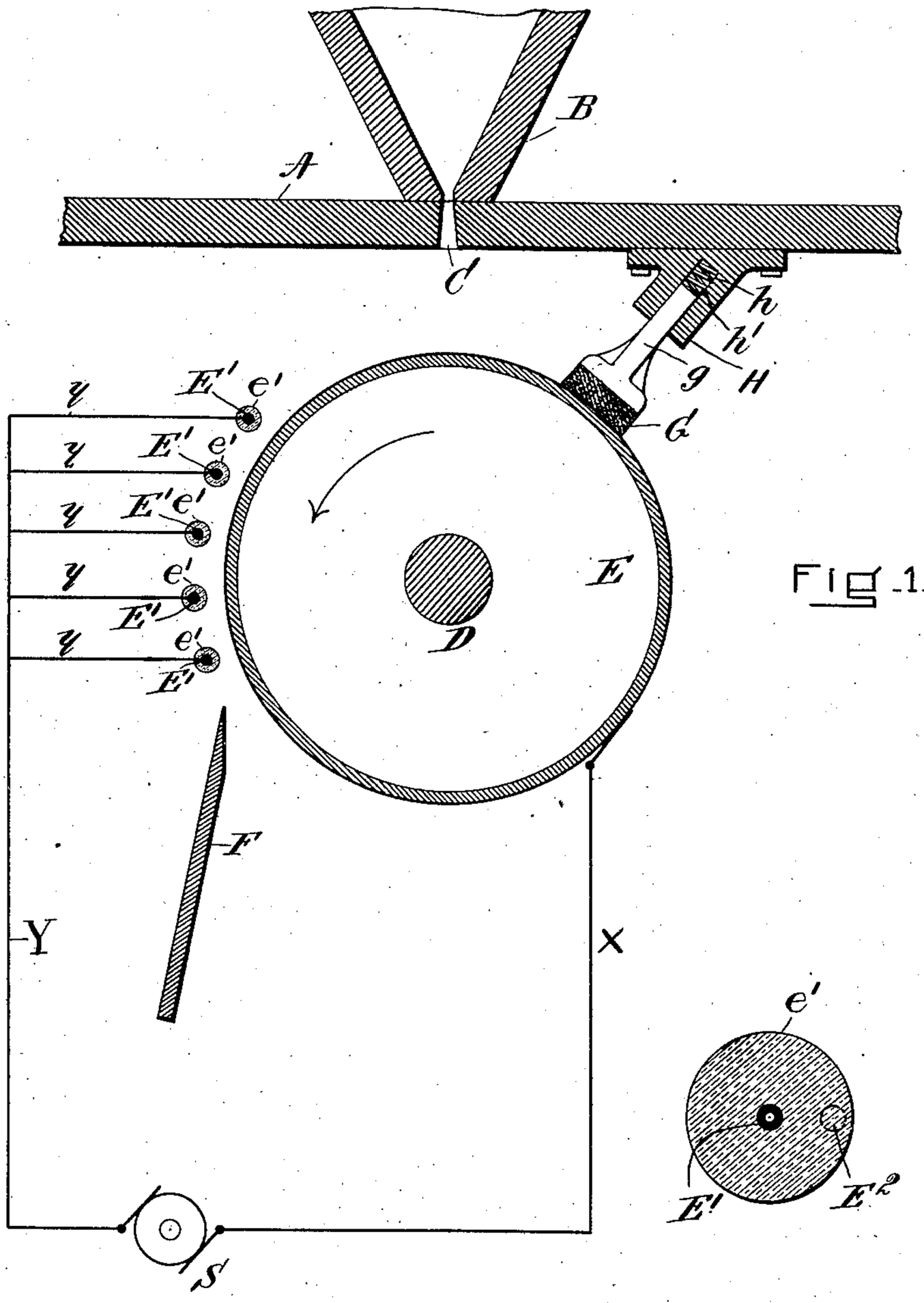

Fig. 1.

Fig. 2.

WITNESSES:

Joseph T. Brennan.

Grace E. Gibbons.

INVENTOR:

Granley W. Pickard

by Robertson Mitchell

Attorneys

UNITED STATES PATENT OFFICE.

GREENLEAF WHITTIER PICKARD, OF AMESBURY, MASSACHUSETTS, ASSIGNOR TO HUFF ELECTROSTATIC SEPARATOR COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

ELECTROSTATIC SEPARATOR.

No. 840,802. Specification of Letters Patent. Patented Jan. 8, 1907.

Application filed January 29, 1906. Serial No. 298,381.

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 Electrostatic Separators, of which the following is a specification.

My invention relates to electrostatic separators, and has for its object the improved efficiency of such apparatus; and it consists of certain improvements hereinbelow described.

My improved apparatus is intended and adapted to separate particles of solid material which are differentiated from each other by their susceptibility to receive and respond to electrostatic charge on being brought into effective contact with the charged body. Typical examples of such mixtures of solid particles are to be found in metal-bearing ores in their mixtures with gangues and earths of practically no value.

In the drawings hereto annexed, Figure 1 is a vertical cross-section of a portion of an electrostatic separator, showing the arrangement of electrodes; and Fig. 2 shows, on an enlarged scale, a portion of one of the electrodes and a cross-section of one of the subdivisions of the opposite electrode.

Referring to Fig. 1, A is a portion of the casing or frame of an electrostatic separator upon which is mounted a hopper B, which may be of any suitable construction whereof the purpose is to deliver comminuted material, as through the aperture C, to the electrode E, which is shown as a cylinder mounted to rotate in the direction indicated by the arrow upon a shaft D. The opposite electrode is divided into a number of subdivisions E′, these being preferably quite fine copper wires arranged parallel to each other and to the axis D of the electrode E. Each of these subdivisions is preferably incased in a relatively thick glass or other dielectric envelop e'. A partition or divider F is located below the lowermost subdivision E′ and serves in the usual way to direct the fall of those portions of the material which are selected by the effect of the electrical charge manifested at the two electrodes. Such particles as cling to the larger electrode E are wiped or brushed therefrom by the wiper G, which, as herein shown, is mounted upon rods g, which slide in holes, as h, in the socket-pieces H, the wiper being held pressed against the electrode E, as by a spring h'.

The subdivisions E′ are connected by wires y to the main branch Y of the electrical circuit and the electrode E is connected, as by wire X, which is the other branch of the circuit, these branches emanating from the source S of electrical energy, which is conventionally illustrated in the drawings. The exciting apparatus which I prefer to employ is such a one as is described in Letters Patent No. 796,011, dated August 1, 1905, issued to me as assignor to Charles H. Huff.

Each of the subdivisions E′ of the electrode opposed to the repelling-electrode E is placed so that its electrical proximity to the electrodeE is closer than to the next adjacent subdivision E′. I employ the term "electrical proximity" because it is quite possible so to arrange the subdivisions E′ with their dielectric envelops e' that the electrodes E′ themselves are in closer proximity measured in actual distance to each other than to the larger electrode E, and yet by reason of the presence of the dielectric envelops e' they are electrically closer to the electrode E′ than to each other. This condition may be explained by reference to Fig. 2. The dielectric permeability of the envelop e' being superior to that of the surrounding air the arrangement and concentration of the lines of force between the subdivision E′ and the repelling-electrode E is the same in substance as if the subdivision E′ were placed in the position shown at E^2, but without any dielectric envelop. Thus another subdivision E′ might be so placed that the two subdivisions of the electrode would be nearer to each other by special measurement than either to the larger electrode E; but, electrically speaking, would each be nearer the electrode E than to its neighbor E′. Consequently by the arrangement shown the concentration of lines of force between each of the subdivisions E′ and the repelling-electrode E is just as intense as though only a single electrode, as E′, were opposed to the repelling-electrode, and there are generated therefore a succession of intense fields separated by intervals of far inferior intensity. If the subdivisions of the opposed electrode were nearer to each other, electrically speaking, than to the repelling-

electrode, the result would be a dispersion of lines of force and a deterioration of intensity, the extreme condition being represented, say, by a number of wires very close together strung parallel to each other and to the surface of the repelling-electrode, each of the wires being electrically much closer to its neighbor than to the repelling-electrode. Under these conditions the field produced would not differ materially from that which would result from the employment of a plate concentric with the repelling-electrode.

In operation the above-described arrangement of repelling-electrode and subdivided opposed electrode effects a very thorough separation of particles susceptible to repulsion. The major part of the separation apparently occurs at or near the concentrated field between the uppermost of the subdivisions E′ and the repelling-electrode E; but the passage of the material through the successive regions of high concentration of field enables the electrical stress to search out the remaining susceptible particles and to remove them from the inert portion of the mass which either falls within the barrier of the divider F or is brushed from the electrode E by the wiper G.

What I claim is—

In an electrostatic separator, a repelling-electrode; means to feed material thereto, an opposite electrode divided into a plurality of subdivisions each of small superficial extent as contrasted with the repelling-electrode and each of said subdivisions being inclosed in a dielectric envelop, to bring the subdivisions into closer electrical proximity to the repelling-electrode than to each other, and means for electrically exciting the said electrodes.

Signed by me at Boston, Massachusetts, this 25th day of January, 1906.

GREENLEAF WHITTIER PICKARD.

Witnesses:

JOSEPH T. BRENNAN,

GRACE E. GIBBONS