Oct. 1, 1940. E. O. SCHWEITZER, JR 2,216,254

ELECTRIC FIELD DEVICE FOR SEPARATING PARTICLES OF MATERIAL

Filed April 15, 1937

Fig. 1.

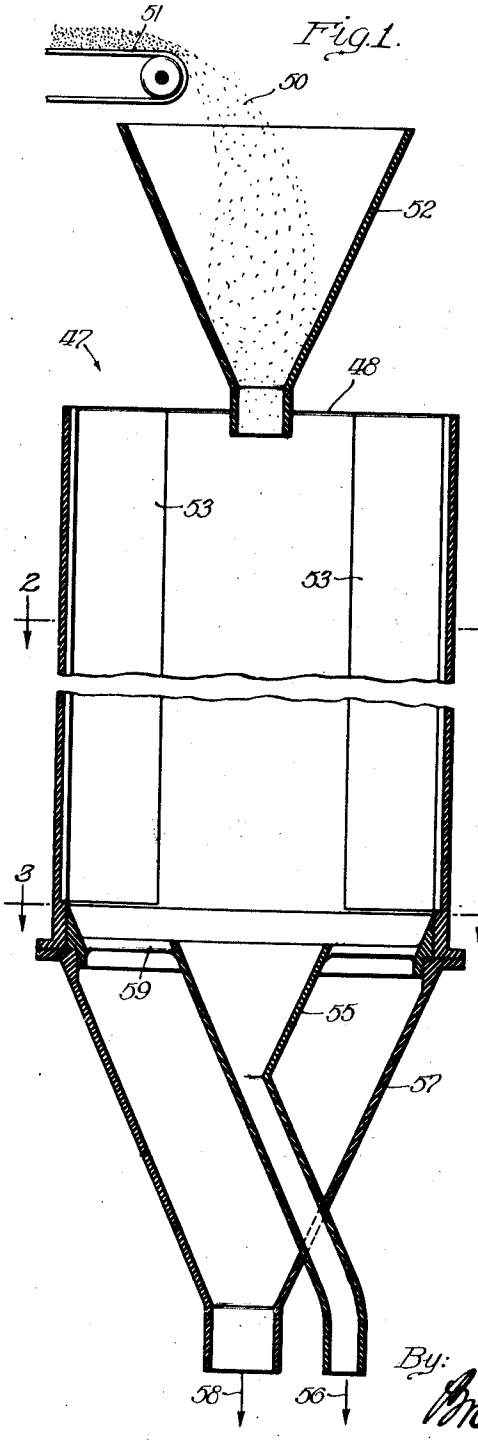


Fig. 2.

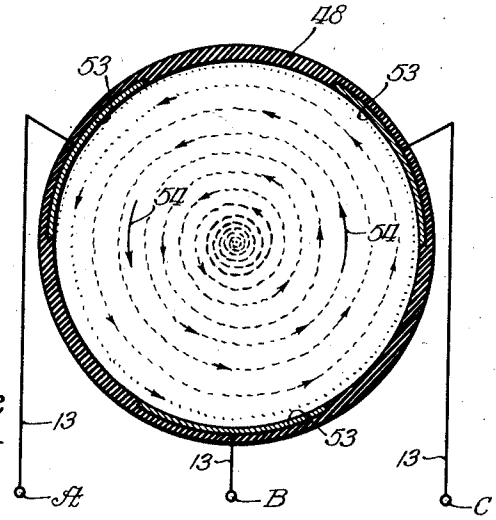
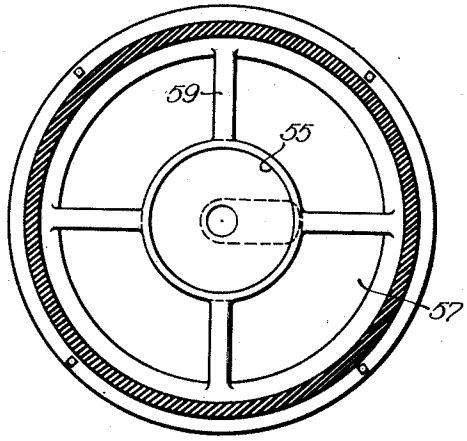


Fig. 3.



Inventor:
Edmund O. Schweitzer, Jr.

By: Brumbaugh, Graves, Donohue & Raymond

Attys.

Patented Oct. 1, 1940 2,216,254

UNITED STATES PATENT OFFICE

2,216,254

ELECTRIC FIELD DEVICE FOR SEPARATING PARTICLES OF MATERIAL

Edmund O. Schweitzer, Jr., Northbrook, Ill.

Application April 15, 1937, Serial No. 136,986

2 Claims. (Cl. 209—127)

My invention relates, generally, to electrical devices and it has particular relation to electric field devices in which an electric field is arranged to react with certain types of matter in a new and novel manner.

The principal object of my invention is to create a shifting electric field and use the same for moving different types of matter as a result of interaction therebetween.

Another object of my invention is to separate particles of material having different dielectric constants by subjecting them to the influence of a rotating electric field.

Other objects of my invention will, in part, be obvious and in part appear hereinafter.

Accordingly, my invention is disclosed in the embodiment thereof shown in the accompanying drawing, and it comprises the features of construction, combination of elements, and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the appended claims.

For a more complete understanding of the nature and scope of my invention reference may be had to the following detailed description, taken in connection with the accompanying drawing, in which:

Figure 1 is a vertical sectional view of separating apparatus in which the principles of the present invention are embodied;

Figure 2 is a detail section view taken along the line 2—2 of Figure 1; and

Figure 3 is a sectional view taken along the line 3—3 of Figure 1.

My invention may be employed for the separation of particles of material having different dielectric constants. For this purpose the apparatus shown in Figures 1, 2 and 3 of the drawing may be employed. The reference character 47 designates, generally, a separator of this type and it comprises a tubular housing 48 the longitudinal axis of which is disposed in a vertical position. The material 50 to be separated may be fed to the apparatus by a conveyor 51 and directed into the housing 48 by a hopper 52.

As shown more clearly in Figure 2, the housing 48, which is formed of suitable insulating material, has provided around its inner periphery electric field pieces 53 which may extend throughout substantially its entire length. The electric field pieces 53 may be formed of any suitable conducting material such as brass, copper or aluminum, and the inner surfaces generally form arcuate sections of a cylinder. The electric field pieces 53 may be connected by the conductors 13 to the terminals A, B and C, which, it will be understood, are energized from a suitable source of polyphase alternating current.

Assuming, for the purposes of illustration, that the material 50 comprises a mixture of finely ground grain in which a small percentage of fine metal particles is included, the particles of grain, which have a relatively high dielectric constant, will be caused to rotate by the action of the shifting electric field in the direction indicated by the arrows 54, (Figure 2), while the metal particles will be unaffected.

Since the material 50 is introduced into the housing 48 substantially axially thereof, and hence at the upper end of the axis of the rotating electric field generated between the electric field pieces 53, the particles having the relatively high dielectric constant will be rotated and, because of the centrifugal force created by virtue of this rotation, they will travel outwardly and, due to the force of gravitation, they will travel downwardly so that their path is generally in the form of a helix of ever increasing radius. The metal particles, since they are unaffected by the rotating electric field, will drop directly downwardly, solely under the influence of gravity.

Centrally located at the lower end of the housing 48 is a spout 55 for receiving the particles, such as the metal particles described, that are substantially unaffected by the rotating electric field, and for causing them to flow in a stream as indicated by the arrow 56. The remaining particles are received by a spout 57 and the particles flow therefrom as indicated by the arrow 58. The spouts 55 and 57 may be formed of suitable insulating material and they may be held in the relative positions shown by means of a suitable spider 59 that also is formed of insulating material.

While the apparatus 47 shown in Figures 1, 2 and 3 of the drawing is illustrated for separating the material 50 into two components, it will be understood that it may be separated into more components, as may be required. Depending upon the length of the tubular housing 48, the speed of rotation of the electric field, the difference in dielectric constants of the various particles being separated, and possibly other factors, different degrees of separation may be obtained.

Since certain further changes may be made in the foregoing construction, and different embodiments of the invention may be made without departing from the scope thereof, it is intended that all matter hereinbefore described or shown

in the accompanying drawing shall be interpreted as illustrative, and not in a limiting sense.

I claim as my invention:

1. In apparatus for separating particles of material having different dielectric constants, in combination, a housing having a cylindrical opening therethrough the longitudinal axis of which is positioned substantially vertically for receiving the material centrally of the upper end, a plurality of electric field pieces having their inner surfaces in the form of arcuate sections of a cylinder disposed longitudinally of said opening in insulated spaced relation, and circuit means for connecting said field pieces to a source of polyphase alternating current whereby a continuously progressive shifting of the polarities of the field pieces is caused in said housing and particles having a higher dielectric constant are rotated along a spiral path of increasing radius at a higher speed than are particles having a lower dielectric constant.

2. In apparatus for separating particles of material having different dielectric constants, in combination, a housing having a cylindrical opening therethrough, a plurality of electric field pieces having their inner surfaces in the form of arcuate sections of a cylinder disposed longitudinally of said opening in insulated spaced relation, means for projecting the particles of material into said housing in a substantially axial direction of said cylinder, and circuit means for connecting said field pieces to a source of polyphase alternating current whereby a continuously progressive shifting of the polarities of the field pieces is caused in said housing and particles having a higher dielectric constant are rotated along a spiral path of increasing radius at a higher speed than are particles having a lower dielectric constant.

EDMUND O. SCHWEITZER, JR.