

METHOD OF AND APPARATUS FOR SEPARATING AND CLEANING MATERIALS IN AN ELECTROSTATIC FIELD
APPLICATION FILED FEB. 2, 1915.

Patented Apr. 18, 1916.

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METHOD OF AND APPARATUS FOR SEPARATING AND CLEANING MATERIALS IN AN ELECTROSTATIC FIELD.

1,179,937.

Specification of Letters Patent.

Patented Apr. 18, 1916.

Application filed February 2, 1915. Serial No. 5,725.

To all whom it may concern:

Be it known that I, JAKOB KRAUS, a citizen of the German Empire, and resident of Brunswick, Germany, have invented certain new and useful Improvements in the Methods of and Apparatus for Separating and Cleaning Materials in an Electrostatic Field, of which the following is a specification.

My invention relates to improvements in the method of and apparatus for separating and cleaning materials in an electrostatic field, and more particularly in the method and apparatus, in which a dielectric septum is located in front of the attracting pole or poles, which prevents the attracted particles from being repelled again and crossing the path of the particles being attracted. In apparatus of this class the dielectric septum can either be movable or stationary. In the former case the dielectric septum is itself used for removing the attracted particles from the electrostatic field, and in the latter case the particles which have been attracted by the stationary dielectric septum are removed by stripping elements or the like.

My invention is based on the fact, that the attractive effect of an electrode used in electrostatic separators of the class described is limited to the electrostatic field which is generated by the pole. Therefore, when an electrostatic field is used which is movable relatively to the dielectric septum, the attractive power of the said pole acts only in the part of the dielectric septum which is within the electrostatic field, and it has no effect when the electrostatic field leaves this part of the dielectric septum. For example, if above a stationary dielectric an electrode is provided which has intermittent movement relatively to said septum, in the first position of the electrode on a portion of the dielectric septum which is within the field of the pole the particles of the material which are subject to the electrostatic action are attracted and held by the dielectric septum, and they are dropped by the dielectric septum when the electrode and the field produced thereby travel forward so that the said portion of the dielectric septum becomes inactive and another part of the dielectric septum is in position for being acted upon by the pole. In my improved method

and apparatus this fact is made use of, and accordingly I provide means for shifting the pole or poles and the dielectric septum relatively to each other in such a way, that traveling electrostatic fields and intermediate neutral zones are produced which are alternately brought into positions for acting on the material, so that strips of the material are alternately subjected to the attractive effect of the fields and dropped by the dielectric septum.

For the purpose of explaining the invention an example of an apparatus which is suitable for putting my improved method into effect has been shown in the accompanying drawing, in which the same letters of reference have been used in all the views to indicate corresponding parts.

In said drawing Figure 1, is a vertical longitudinal section of the apparatus, and Fig. 2, is a cross-section taken on the line A—B of Fig. 1.

In the example shown in the drawing the material such for example as grits, grain, kernels or the like, is placed on a movable inclined sieve 1 which is supported on links 2 having rocking supports on the side members of a frame 3. To the said sieve the material is supplied through a funnel or chute 4 located at the left hand side of the apparatus. The material is gradually advanced on the sieve by reciprocating the same longitudinally of its axis, and as the material is thus being reciprocated it is subjected to the action of the electrostatic field.

For producing the electrostatic field a series of electrodes 5 are provided above the sieve which are disposed at certain distances one beside the other and on a frame 6. The frame 6 is suspended by means of links 7 provided at their upper ends with rollers 8 from rails 9 secured to the top of the apparatus. The frame 6 is connected at its ends by arms 11 and 12 to a frame 13 which carries trays 14 arranged at certain distances from one another and staggered with relation to the electrodes 5 located above the same. Between the frames 6 and 13 and above the sieve a dielectric plate 15 is mounted, the length of which is such that it projects at both ends beyond the space covered by the electrodes.

The frames 6 and 13 which are connected with each other are adapted to be reciprocated by suitable means. For example a connecting rod 16 is jointed at one end to the frame 6 which rod is jointed at its
 5 opposite end to a crank disk 17, and the crank disk 17 is connected by a belt 18 with a pulley 19. On the shaft of the pulley 19 a pulley 20 is mounted which is adapted to be rotated by means of a belt 21 from a pulley 22. To the shaft of the pulley 22 a crank arm 23 is secured which is adapted to reciprocate the sieve 1 by means of a connecting rod 24.

15 In the position of the parts shown in Fig. 1 the electrodes 5 act on the parts of the material which are located between the trays 14, so that the strip-like portions *a* of the dielectric septum 15 which are located in
 20 these fields attract the lighter particles of the material and hold the same. But the intervening strips *b* of the dielectric plate or septum 15 do not attract the particles, because they are not located in the electrostatic fields. Now the frame 6 is shifted by
 25 the crank 16 for example to the right, so that the electrodes 5 get in positions above the strips *b* of the dielectric septum 15, and the said strips *b* attract particles of the material. The particles of the material which
 30 before were attracted by the strips *a* get out of the positions in which they are acted upon by the electrostatic fields, so that they are dropped from the dielectric septum. These particles fall on the trays 14, because
 35 the frame 13 which carries the trays 14 has been shifted in the same direction as the frame 6 which carries the electrodes. When shifting the frames 6 and 13 in the opposite
 40 direction the operation is repeated in the same way.

The particles of the material which have been dropped on the trays are removed laterally of the machine and into passages
 45 25, for which purpose the bottoms of the said trays are arranged in inclined position and the trays are provided with shaking means. Therefore by continuously reciprocating the electrodes 5 relatively to the dielectric septum 15 traveling electrostatic
 50 fields and intermediate neutral zones are produced, within which the particles of the material are alternately attracted by and released from the dielectric septum 15 in
 55 sections corresponding to the strips *a* and *b*.

While I have shown an apparatus in which the electrodes and trays are connected with each other so as to form frames in the form of gratings, I wish it to be understood,
 60 that my invention is not limited to this construction. Furthermore my invention is not limited to the form of the dielectric septum shown in the drawing, which dielectric septum may be constructed in other suitable
 65 forms. This modification and others may

be made without departing from the nature of my invention as set forth in the appended claims.

I claim herein as my invention:

1. The herein described method of separating or cleaning materials, which consists in producing in a dielectric septum alternate electrostatic fields and neutral zones, causing these fields and zones to travel relatively to the dielectric septum and in position for acting on the material to be separated, and removing the particles of the material which have been attracted to the field portions of said septum and subsequently released from the neutral zones thereof. 80

2. In a separator or cleaner, the combination with means for supporting the material to be separated or cleaned, of a dielectric septum disposed in position for acting on the material placed on the support, means for producing in said dielectric septum alternate electrostatic fields and neutral zones, means for effecting relative movement of said electrostatic fields and neutral zones on the one hand and the dielectric septum on the other hand, and means to remove the material which has been attracted to and released from the dielectric septum. 85

3. In a separator or cleaner, the combination with means for supporting the material to be separated or cleaned, of a dielectric septum disposed in position for acting on the material placed on the support spaced, electrostatic poles located at the side of the dielectric septum which is opposite to the support, gathering means located between the support and dielectric septum and staggered with relation to the poles, and means for effecting relative movement of said poles and gathering means on the one hand and said dielectric septum on the other hand. 90

4. In a separator or cleaner, the combination with means for supporting the material to be separated or cleaned, of a stationary dielectric septum disposed in position for acting on the material placed on the support spaced, electrostatic poles located at the side of the dielectric septum which is opposite to the support, gathering means located between the support and dielectric septum and staggered with relation to the poles, and means to move said poles and gathering means relatively to the dielectric septum. 95

5. In a separator or cleaner, the combination with means for supporting the material to be separated or cleaned, of a stationary dielectric septum disposed in position for acting on the material placed on the support spaced, electrostatic poles located at the side of the dielectric septum which is opposite to the support, gathering means connected with said poles and located between the support and dielectric septum and 100

staggered with relation to the poles, and common means to move said poles and gathering means relatively to the dielectric septum.

5 6. In a separator or cleaner, the combination with means for supporting the material to be separated or cleaned, of a stationary dielectric septum disposed in position for acting on the material placed on the support spaced, electrostatic poles located at the
10 side of the dielectric septum which is opposite to the support, gathering means connected with said poles and located between the support and dielectric septum and staggered with relation to the poles, and common means to reciprocate said poles and gathering means relatively to the dielectric
15 septum.

20 7. In a separator or cleaner, the combination of a dielectric septum, means for feeding the material to be treated, past said septum on one side thereof, means for producing in said septum, traveling spaced electrostatic fields and neutral zones alternating therewith, and means for removing the
25 particles which have been attracted to the field portions of said septum and subsequently released from the neutral zones thereof.

8. In a separator or cleaner, the combination of a dielectric septum, means for feeding the material to be treated, past said septum on one side thereof, spaced electrostatic poles located on the other side of said septum to produce therein spaced electrostatic
30 fields alternating with neutral zones, gathering means stationary relatively to said poles and staggered with reference thereto, and located on the same side of the septum past which the material is fed, and means
35 for effecting relative movement of the poles and gathering means on one hand, and the septum on the other hand, to cause the said alternating fields and neutral zones to travel
40 within the septum, so that the particles attracted against the septum by the field portions thereof, and subsequently released by the neutral zones of the septum, may be received and removed by said gathering
45 means.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

JAKOB KRAUS.

Witnesses:

CARL KAMPE,
OTTO PIETRSCHE.