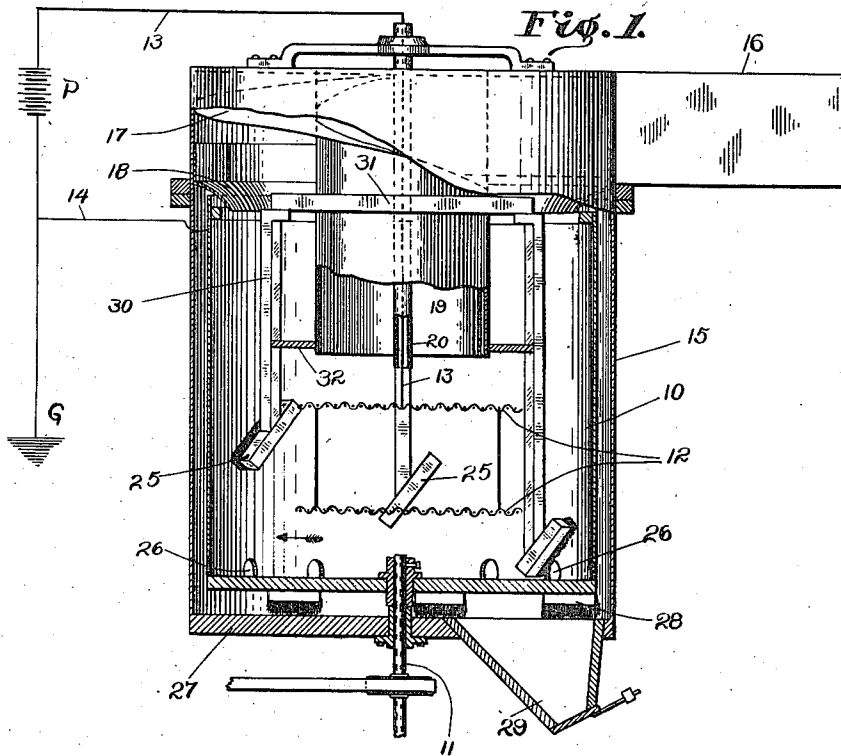
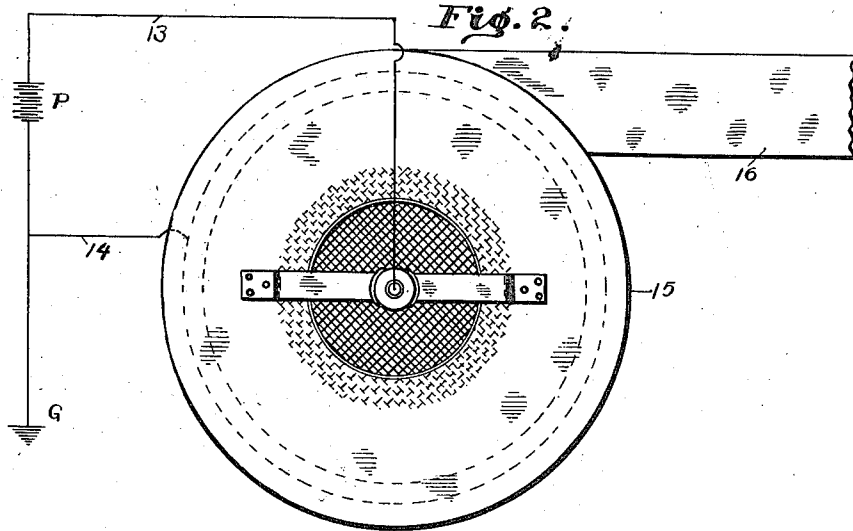


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 APPARATUS FOR SEPARATION OF PARTICLES FROM A FLUID STREAM.
 APPLICATION FILED MAY 31, 1907.

949,041.

Patented Feb. 15, 1910.



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APPARATUS FOR SEPARATION OF PARTICLES FROM A FLUID STREAM.

949,041.

Specification of Letters Patent.

Patented Feb. 15, 1910.

Application filed May 31, 1907. Serial No. 378,717.

To all whom it may concern:

Be it known that I, LAWRENCE N. MORSCHER, a citizen of the United States, residing at Enterprise, in the county of Dickinson and State of Kansas, have invented certain new and useful Improvements in Apparatus for the Separation of Particles from a Fluid Stream, of which the following is a specification.

The object of my invention is to produce an apparatus for the separation of particles from a poorly conducting fluid-stream by driving the particle-laden fluid-stream into and through an electrical field between two electrodes, one discharging toward the other.

A further object of my invention is to cause that electrode toward which the electrical discharge takes place, to move at a speed approximating that of the fluid-stream and in the same direction, whereby the particles, having become charged with a potential of the same sign as the discharging electrode, will be repelled toward the moving electrode and, when it reaches or approaches said electrode will, so far as the electrode is concerned, be in a substantial calm.

A further object of my invention is to embody the mechanism in such form that the particles may be urged by centrifugal force in the same direction as that caused by the electrical action.

The accompanying drawings illustrate, diagrammatically, an apparatus embodying my invention.

Figure 1 is a partial vertical section and Fig. 2 is a plan.

In the drawings, 10 indicates a cylindrical electrode carried by a shaft 11 by means of which it may be rotated at any desired speed. Mounted within the electrode 10 is a discharging electrode or electrodes 12 which, in the present case, are reticulated disks presenting sharp edges and points to facilitate electrical discharge. The electrodes 12 are connected by a suitable conductor 13 with one side of a source of high potential P, the said source P being also grounded at G in order to place the balance of the apparatus, now to be described, in a neutral condition.

The particle-laden fluid-stream may be introduced into the electrode 10 in any desirable manner, but I find it convenient to provide a stationary casing 15 which en-

velops the electrode 10 and is provided with a tangentially arranged induction duct 16, a downwardly inclined spiral deflector 17, being provided to direct the fluid-stream from the duct 16 spirally downwardly into the open receiving-end of the electrode 10, said end being guarded, preferably by a suitable guard flange 18.

In order that the operation of the apparatus may be continuous, I provide an outlet tube 19 for the fluid stream, said tube being stationary axially of the electrode 10 and extending into the open receiving end of electrode 10 to a point quite near to the discharging electrodes 12. In order that the outlet 19 may not be affected by the conductor 13, said conductor is passed through an insulating tube 20 which passes down through the outlet passage 19.

In operation the particle-laden fluid-stream is driven through the induction passage 16 at a high velocity into the inclosing casing 15 being deflected by the spiral deflector 17 downward into the electrode 10. The electrode 10 is revolved at a speed substantially equal to the angular velocity of the whirling fluid-stream and the particles are urged outward by centrifugal action toward the electrode 10. At the same time the particles in the fluid stream come into the discharging field of the electrodes 12 and are there charged with a potential substantially equal to, and of the same sign as, the potential of the electrodes 12, thereupon becoming mutually repellent as well as repelled by the electrodes 12. The repellent forces thus act in the same direction as the centrifugal force to urge the charged particles outward from the center of the mass and to the inner face of the revolving electrode 10. The electrode 10 has, upon its inner face, a charge of a sign opposite to that of the electrodes 12, and when the charged particles approach the inner face of said electrode a greater induced charge of the opposite sign, *i. e.*, opposite to that of the potential of the dust particles, is produced on the inner face of the electrode 10, thus causing the charged dust particles to be attracted toward and finally stick to the inner face of the electrode 10. This action would, in course of time produce a considerable deposit of particles upon the inner face of the revolving electrode 10, and render the further operation either inefficient

or impossible. In order, therefore, to make a continuously operating device, I find it advisable to arrange within the electrode 10 a series of brushes 25 adapted to contact with the inner face of the electrode 10 and, as the electrode is rotated in the direction indicated by the arrow, engage the particles which are sticking to the inner face of the electrode and brush them down to the bottom where they are pushed out through suitable discharge openings 26 so as to fall upon the bottom 27 of the inclosing casing 15, being brushed therefrom by brushes 28 into a discharge hopper 29. The brushes 25 may be conveniently supported upon the lower ends of rods 30 suspended from support 31 and, in order to compel the fluid stream to pass close to the inner wall of the electrode 10, I provide, close to the electrodes 12, a baffle plate 32. By this means I have produced an apparatus which is capable of continuous operation.

I claim as my invention:

1. An apparatus for separating particles from a fluid stream comprising, a rotatable container, independent means for imparting to a particle-laden fluid stream an initial movement in the direction of rotation of the container outside thereof and subsequently introducing said moving particle-laden fluid stream therefrom into the container in the direction of movement thereof at the time of introduction.
2. An apparatus for separating particles from a fluid-stream comprising, a movable electrode, an electrode adapted to discharge toward said movable electrode, and means for driving a particle-laden fluid-stream between the two electrodes in the direction of movement of the movable electrode.
3. An apparatus for separating particles from a fluid-stream comprising, a rotatable, hollow electrode, a discharging electrode arranged within said rotatable electrode and adapted to discharge toward said rotatable electrode, and means for driving a particle-laden fluid-stream into said rotatable electrode at an angular velocity nearly equal to and in the same direction as the angular velocity of the rotating electrode.
4. An apparatus for separating particles from a fluid-stream comprising, a rotatable, hollow electrode, a discharging electrode arranged within said rotatable electrode and adapted to discharge toward said rotatable electrode, and means for driving a particle-laden fluid-stream into said rotatable electrode at an angular velocity in the same direction as the angular velocity of the rotating electrode.
5. An apparatus for separating particles from a fluid stream comprising, a rotatable container, independent means for imparting to a particle-laden fluid stream an initial movement in the direction of rotation of the

container outside thereof and subsequently introducing said moving particle-laden fluid stream therefrom into the container in the direction of movement thereof at the time of introduction, and means for removing particles from the inner wall of the container.

6. An apparatus for separating particles from a fluid stream comprising, a rotatable container, independent means for imparting to a particle-laden fluid stream an initial movement in the direction of rotation of the container outside thereof and subsequently introducing said moving particle-laden fluid stream therefrom into the container in the direction of movement thereof at the time of introduction, stationary brushes arranged within the container and adapted to contact with the interior thereof to drive the particles carried by the container toward and through suitable outlets formed in said container.

7. An apparatus for separating particles from a fluid stream comprising, a rotatable container, independent means for imparting to a particle-laden fluid stream an initial movement in the direction of rotation of the container outside thereof and subsequently introducing said moving particle-laden fluid stream therefrom into the container in the direction of movement thereof at the time of introduction, brushes arranged within the container and adapted to contact with the interior thereof to drive the particles carried by the container toward and through suitable outlets formed in said container.

8. An apparatus for separating particles from a fluid-stream comprising, a movable electrode, an electrode adapted to discharge toward said movable electrode, means for driving a particle-laden fluid-stream between the two electrodes in the direction of movement of the movable electrode and means for engaging the movable electrode for removing particles adhering thereto.

9. An apparatus for separating particles from a fluid-stream comprising, a rotatable, hollow electrode, a discharging electrode arranged within said rotatable electrode and adapted to discharge toward the same, means for driving a particle-laden fluid-stream into one end of said rotatable electrode at an angular velocity of the same sign as the angular velocity of the rotating electrode, and means for engaging the interior of said rotatable electrode and removing particles adhering thereto.

10. An apparatus for separating particles from a fluid-stream comprising, a casing having an induction passage leading thereinto tangentially, a rotatable electrode mounted in said casing and having an open end adapted to receive a fluid stream from said tangentially-arranged induction passage, means for rotating said electrode in

the direction of angular movement of the fluid-stream, a discharging electrode mounted within the rotatable electrode and adapted to discharge thereto, and a fluid-stream outlet from the rotatable electrode.

11. An apparatus for separating particles from a fluid-stream comprising, a casing having an induction passage leading thereinto tangentially, a rotatable electrode mounted in said casing and having an open end adapted to receive a fluid-stream from said tangentially-arranged induction passage, means for rotating said electrode in the direction of angular movement of the fluid-stream, a discharging electrode mounted within the rotatable electrode and adapted to discharge thereto, a fluid stream outlet from the rotatable electrode, and means for engaging the interior of the rotatable electrode to remove the particles adhering thereto.

12. An apparatus for separating particles from a fluid-stream comprising, a casing having an induction passage leading there-

into tangentially, a rotatable electrode, 25 mounted in said casing and having an open end adapted to receive a fluid-stream from said tangentially arranged induction passage, means for rotating said electrode in the direction of angular movement of the 30 fluid-stream, a discharging electrode mounted within the rotatable electrode and adapted to discharge thereto, there being a fluid-stream outlet from within the rotatable electrode, and brushes mounted within the ro- 35 tatable electrode and engaging the same to scrape particles from the electrode and eject the same through suitable outlets formed therethrough.

In witness whereof, I, have hereunto set 40 my hand and seal at Enterprise, Kansas, this 22d day of May, A. D. one thousand nine hundred and seven.

LAWRENCE N. MORSCHER. [L. s.]

Witnesses:

GEO. W. MERRILLAT,
W. R. WEEKS.