

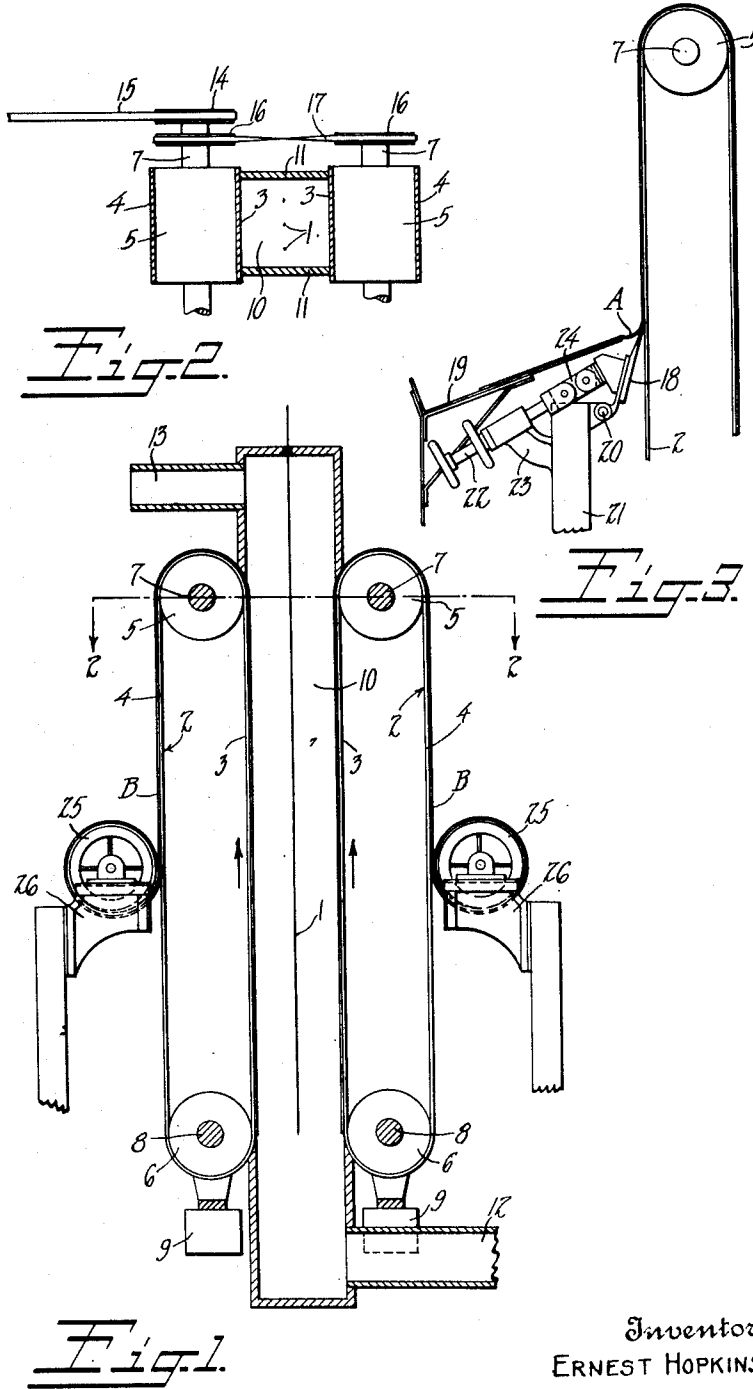
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METHOD AND APPARATUS FOR ELECTRICAL PRECIPITATION

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METHOD AND APPARATUS FOR ELECTRICAL PRECIPITATION.

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To all whom it may concern:

Be it known that I, ERNEST HOPKINSON, a citizen of the United States, and a resident of New York, county and State of New York, have invented certain new and useful Improvements in Methods and Apparatus for Electrical Precipitation, of which the following is a full, clear, and exact description.

This invention relates to apparatus and methods for collecting, by electric precipitation, particles of matter contained in air or gas. The principal object of the invention is to provide a method and an apparatus adapted for carrying out the method, whereby the particles of matter collected as an electric precipitation are transferred in their supported position upon the collecting electrode beyond the electric field where they can be easily removed from the electrode in the most suitable manner depending largely upon the nature of the material precipitated.

Referring to the drawings forming a part of this specification,

Figure 1 is an elevation, partly in section, showing an apparatus embodying and adapted to carry out the present invention.

Figure 2 is a transverse part sectional view through the plane 2—2 of Figure 1 with certain parts not shown, and

Figure 3 is a fragmental elevation of a portion of the apparatus showing a modified form of construction.

Previous to the present invention the collecting electrode has been either stationary or given a movement that would merely transfer the deposit from one part to another part of the electric field. The deposit therefore never got beyond the electric field, and was thus always confined within the enclosure provided by the collecting electrode that formed the boundary for the field. It was therefore necessary to remove the deposit from the electrode while in this out-of-the-way place within the enclosure. Such types of apparatus are only adapted for collecting particles of matter of a dry or non-adhering nature that will fall from the collecting electrode or that may be easily removed while within the field in the comminuted form by the aid of a scraper or brush. When, however, the particles precipitated are of a more or less sticky consistency to cause them to adhere to the surface of the electrode to form a coherent

sheet thereon the apparatus of the prior art are not suitable for practical and safe removal of the sheet thus deposited. This is especially true where it is desired to provide for a continuous deposit of the particles of matter.

The present invention is therefore directed to a method and an apparatus wherein the removal of the deposit from the electrode takes place entirely beyond the electric field. This makes it possible to transfer the deposit while on the electrode entirely outside of the enclosure or confines of the electric field. That is to say the deposit may be brought into the "open" where it can be seen and handled at will. This permits the collection and easy removal of any kind of material, whether it be in the nature of dry particles or particles of sticky adhering properties. And the removal of the deposit may be thus performed by hand as by means of a hand scraper, brush or the like, or it may be performed by any desired type of removing device operated mechanically or otherwise.

In carrying out the present invention means are provided whereby the collecting electrode, when laden with the deposit of the particles, may be transferred entirely beyond the field for removal therefrom of the particles of matter deposited thereon. To this end a collecting electrode is employed having a portion spaced in oppositely disposed relation to the active electrode to provide an electric field therebetween and another portion beyond the field, and means are provided whereby the collecting electrode may be moved to permit an interchanging of these portions. To provide for these interchangeable portions, the preferred embodiment contemplates the employment of an endless collecting electrode positioned to always have a portion opposite the active electrode and another portion beyond the electric field. In the embodiment shown in the drawings the endless collecting electrode is in the form of a belt as such a construction has many advantages as will later more fully appear, but obviously the invention, as before stated, in its broad aspect contemplates a collecting electrode of any suitable construction adapted to be moved to bring the deposit collected thereon beyond the electric field.

Referring to the drawings, which show a

simple construction, more or less diagrammatically, for carrying out the present invention, the active electrode is indicated by the reference numeral 1 and is intended to represent any preferred or well-known type of active electrode. The collecting electrode is in the form of a belt 2 having a relatively extended portion 3 spaced in oppositely disposed relation to the electrode 1 and co-extensive therewith to provide an electric field therebetween for the passage of the particle-containing fluid, and a portion 4 located entirely beyond the confines of the electric field. The belt is carried by rollers 5 and 6 mounted respectively on shafts 7 and 8. A weight 9 is hung from the shaft 8 to tension the belt. A plurality of these collecting electrodes may be used, if desired, suitably spaced from the active electrode to provide the electric field. In the present instance two such electrodes are shown oppositely disposed to provide the electric field 10 therebetween for the passage of the particle-containing fluid. The portions 3 of these electrodes serve as partial boundaries for the field and the field is further enclosed by the non-conducting walls 11 provided with the inlet 12 and outlet 13.

A drive wheel 14 is connected to one of the shafts 7 and is driven by the belt 15 from any suitable source of power (not shown). Each of the shafts 7 is provided with a wheel 16 connected together by a crossed belt 17 whereby each electrode may be driven to cause the portions 3 to move upward as indicated by the arrows. By the employment of belts as the collecting electrodes the particles will be deposited on the outer surface of the portion within the field and the deposit will be transferred to the opposite side of the belt entirely beyond the electric field, where it will be exposed on the outside of the belt easily accessible for removal.

The material may be removed from the transferred portion of the electrode in any desired manner as by hand operated devices or otherwise. It is preferable however to provide devices for removing the deposit without the need of manual aid. In Figure 3 a stripper or scraper 18 is shown for removing the deposit and cleaning the electrode. Where the deposit is in the form of a coherent sheet it may be removed by this means in sheet form. A sheet A of such a material is shown in the act of being removed, an inclined support 19 being provided to receive the sheet. The scraper 18 is shown in the form of a knife blade having an edge, coextensive with the width of the belt 2, pivotally secured at 20 to a frame 21. A hand-screw 22 is threaded through a bracket 23 secured to the frame 21 and is pivotally secured to the back of the knife by means of the link 24, this be-

ing a convenient means for adjusting the pressure of the knife upon the belt. Figure 1 shows another device for removing the deposit, in this instance rolls 25 are provided, mounted in frames 26 to bear against the belts 2. The rolls may be positively driven at the speed that the belts are moved, if desired, and means may be provided for regulating the pressure between the rolls and belts in any well-known manner. In the present instance the rolls are intended to engage the belts with sufficient pressure to be frictionally driven thereby, and are shown in the process of removing the sheets B of the deposited material from the belts in sheet form and rolling them up to form of each a solid coherent mass. By reason of the weights 9 the belts 2 are kept taut and pressed towards the rolls 25. Also by this construction, as the material is rolled up on the rolls 25 and the latter increase in size, the belt 2 can move laterally to permit such increase in size.

In the production of crude rubber by what is known as the spray method the rubber latex is sprayed in a drying chamber through which passes a current of heated air or other gas which serves to evaporate the liquid content leaving behind the dried rubber. In some instances it has been found however that as the heated gases leave the spraying chamber they carry with them a certain percentage of the rubber in the form of a fine dust and I have found that the apparatus above described is especially adapted for collecting this dust-like rubber. The air or gas containing the particles of rubber is passed, after leaving the spraying chamber, through the inlet 12, through the electric field 10, and out at the exit 13. Two or more of these apparatus may be connected in series for successively treating the particle-containing fluid, if desired, to insure a most thorough separation of the particles.

The rubber particles are of a more or less sticky adhering nature, and when acted upon by the electric field, deposit upon the portions 3 of the collecting electrodes as an adhering continuous sheet of plastic.

The drive of the belt 2 may be continuous to produce a continuous transfer of the deposited material from the electric field to the point beyond the field where it is removed. Or if desired the collecting electrodes may be moved intermittently the portions 3 within the field being permitted to remain at rest until the desired deposit is collected thereon. After the deposit has so collected, the belt may be moved to transfer this laden portion to the opposite side ready for removal, and to transfer a clean portion to the field. The preferred speed of the continually moving belt, or the period of rest of the intermittently moving belt,

will depend upon several factors such as, the area of the belt, the volume and intensity of the electric field, the speed of the fluid passing therethrough, and the quantity and nature of the particles contained in the fluid.

While the electric connections for supplying the electricity to the apparatus are not shown, it will be understood that the present apparatus may be connected in the usual manner to any of the well-known sources of electric supply for apparatus of the present character.

As many apparently widely different embodiments of this invention may be made without departing from the spirit thereof, it is to be understood that I do not intend to limit myself to the specific form of the invention as set forth except as indicated in the appended claims.

Having thus described my invention what I claim and desire to protect by Letters Patent is:—

1. An apparatus for collecting particles of matter from gaseous suspensions thereof, which comprises a relatively extended passageway for the gaseous suspension, an active electrode extending through said passageway, and a collecting electrode movable longitudinally of the passageway.

2. An apparatus for collecting particles of matter from gaseous suspensions thereof, which comprises a relatively extended passageway for the gaseous suspension, an active electrode extending through said passageway, and a collecting electrode movable longitudinally of the passageway and forming part of the wall thereof.

3. An apparatus for collecting particles of matter of a consistency to adhere to form a mass suspended in a gaseous fluid which comprises a relatively extended active electrode, a collecting electrode having a flat portion spaced in oppositely disposed relation to said active electrode and co-extensive therewith to provide an electric field therebetween for the passage of the particle-containing fluid, means whereby the flat portion of said collecting electrode may be transferred beyond the field, and means for removing the deposit therefrom in sheet form and for rolling the sheet into a roll.

4. An apparatus for collecting particles of matter suspended in a gaseous fluid which comprises relatively extended collecting electrodes in the form of belts having portions oppositely disposed to provide an electric field therebetween and other portions beyond said field, walls forming with said first portions the passageway for a particle containing fluid, an active electrode co-extensive with said belts within said field, and rollers for supporting said collecting electrodes

whereby said collecting electrodes may be moved to interchange said portions.

5. An apparatus for collecting particles of matter suspended in a gaseous fluid which comprises relatively extended collecting electrodes in the form of belts having portions oppositely disposed to provide an electric field therebetween and other portions beyond said field, walls forming with said first portions a passageway for a particle containing fluid, an active electrode co-extensive with said belts within said field, rollers for supporting said collecting electrodes whereby said collecting electrodes may be moved to interchange said portions, rolls adapted to frictionally contact with the deposit on the portions of said belts outside said field, and means for yieldingly maintaining said belts in operative relation to said rolls.

6. A method for collecting adhesive particles of matter suspended in a gaseous fluid which comprises depositing the particles in the form of a continuous sheet in an electric field and continuously removing the sheet from said field.

7. A method for collecting particles of matter of a consistency to adhere to form a mass, suspended in a gaseous fluid which comprises forming a deposit of the particles on a collecting electrode by passing the fluid containing the particles through an electric field adjacent said electrode, transferring said laden electrode beyond the field, and while thus transferred removing the deposit therefrom as a solid coherent mass.

8. A method for collecting particles of matter of a consistency to adhere to form a mass, suspended in a gaseous fluid which comprises forming a deposit of the particles on a collecting electrode by passing the fluid containing the particles through an electric field adjacent said electrode, transferring said laden electrode beyond the field, and while thus transferred removing the deposit therefrom in the form of a sheet.

9. A method for collecting particles of matter of a consistency to adhere to form a mass, suspended in a gaseous fluid which comprises forming a continuous deposit of the material on an endless movable electrode by passing the fluid containing the particles through an electric field adjacent a portion of said electrode and moving said endless electrode to transfer said laden portion beyond the field and to transfer an adjacent unladen portion to the field, and while said laden portion is thus transferred removing the deposit therefrom as a continuous sheet.

Signed at New York, county and State of New York, this 27th day of May, 1924.

ERNEST HOPKINSON.