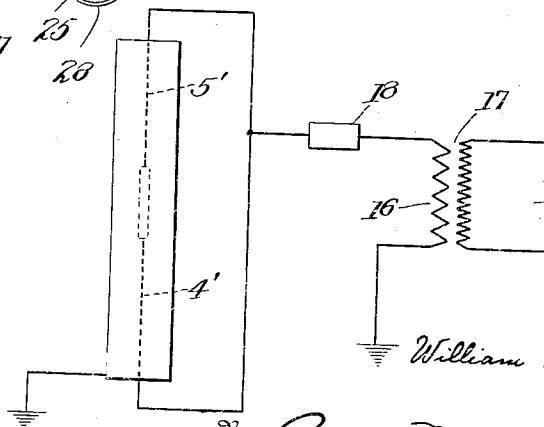
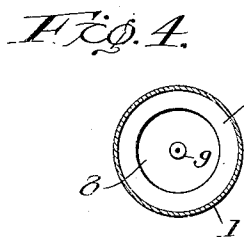
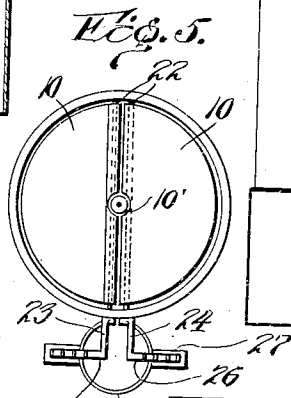
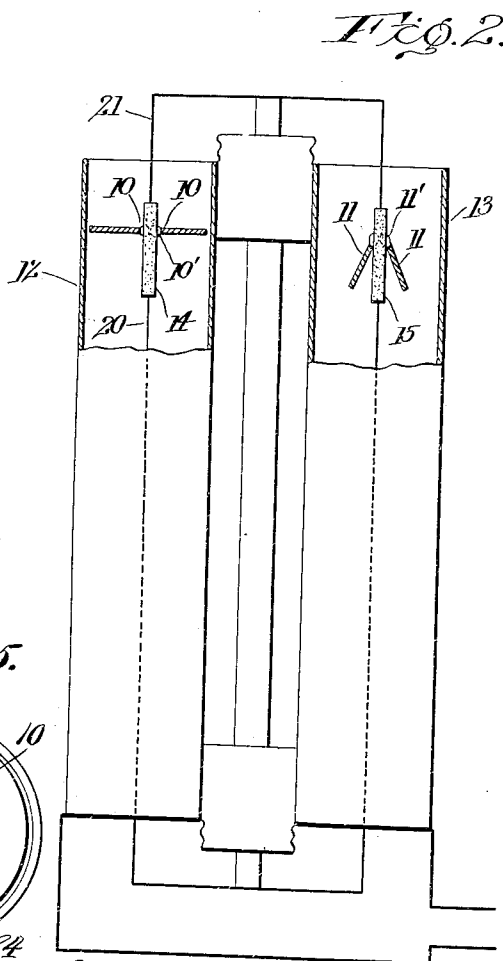
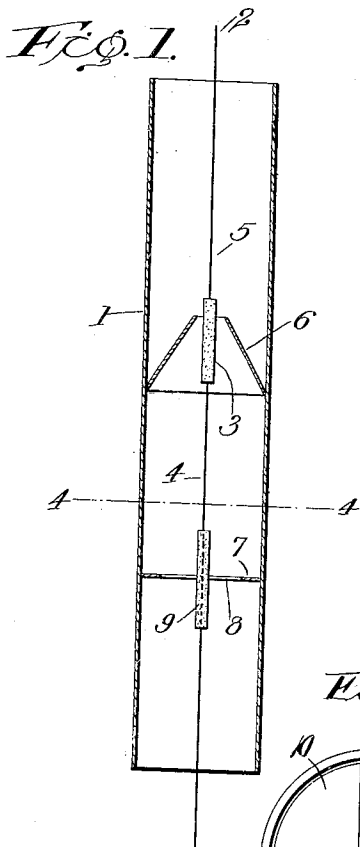


W. W. STRONG.
METHOD OF REGULATING THE VELOCITY OF FUMES PASSING THROUGH ELECTRICAL PRECIPITATORS.
APPLICATION FILED SEPT. 25, 1917.

1,337,489.

Patented Apr. 20, 1920.



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UNITED STATES PATENT OFFICE.

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METHOD OF REGULATING THE VELOCITY OF FUMES PASSING THROUGH ELECTRICAL PRECIPITATORS.

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Specification of Letters Patent.

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Application filed September 25, 1917. Serial No. 193,207.

To all whom it may concern:

Be it known that I, WILLIAM W. STRONG, a citizen of the United States, residing at Mechanicsburg, in the county of Cumberland and State of Pennsylvania, have invented certain new and useful Improvements in Methods of Regulating the Velocity of Fumes Passing Through Electrical Precipitators, of which the following is a specification.

The present invention relates to electrical precipitators.

It is found in practice that gas passing through electrical treater pipes has different velocities in different regions of the cross-sectional area thereof. The velocity of the fumes or gases is usually greatest near the periphery of the pipes.

On the other hand, when treater pipes are arranged in multiple and gas is passed there-through, it is found that different quantities of gas will pass at different velocities through the different pipes.

The object of my invention is to provide means for equalizing the flow of gas in different pipes or in different regions of a single pipe. Ordinary dampers cannot be used in the ordinary way on account of the high potential difference between the discharge electrode and the pipe which is the collecting electrode. It is absolutely necessary that the dielectric be uniform throughout the pipe to produce a uniform silent discharge.

In order to make it possible to place dampers in the pipes for accomplishing the object of my invention, I provide means whereby the critical point of disruptive discharge is raised to the same extent that it is lowered by the introduction of the dampers. In my preferred embodiment I provide an electric gap along the discharge electrode in the form of an insulator link adapted to mechanically interconnect sections of the discharge electrode. By this provision dampers may be placed in the pipe without causing a spark-over or disruptive discharge at voltages below the normal critical voltage.

For a fuller understanding of my inven-

tion I refer to the appended drawings in 50 which:

Figure 1 is a sectional view of a treater pipe embodying my invention;

Fig. 2 an elevation of another form, partly in section to show the application of my invention;

Fig. 3 a diagrammatic view of the electrical arrangement;

Fig. 4 a transverse section on line 4—4 of Fig. 1; and

Fig. 5 is a plan view of a treater pipe and damper mechanism.

In Fig. 1, 1 represents a treater pipe of the usual type constituting the collecting electrode and 2 the discharge electrode. The potential for the charging current is so chosen in practice that it produces a maximum of silent discharge without spark-over. The potential is, therefore, kept just below the point where disruptive discharge takes place. The pipe and the discharge electrode must be as uniformly smooth as it is possible to make them in order to produce this maximum silent discharge and the highest possible degree of efficiency. Any slight projection on either of the electrodes leads to premature disruptive discharge. It is, therefore, easily seen that it is not possible to place dampers or constrictive means of any description within the pipe or flue without lowering the critical point of disruptive discharge in proportion.

In order to admit of the application of dampers or constrictions in the pipe and at the same time prevent a disruptive discharge I provide an insulator link 3. This link 3 serves the purpose of mechanically interconnecting the sections 4 and 5 of the discharge electrode 2 without producing an electrical field thereby. The funnel-shaped shield or screen 6, which is made of insulating material, has its base in engagement with the wall of the pipe 1 and extends toward the insulator link 3. The object of this screen is to force the gas ascending in the treater chamber or pipe 1 into contact with or in close proximity to the electrode 2 to be charged thereby. By this arrange-

ment the gas adjacent the walls of the chamber, which without it would travel at a greater velocity along the walls and might escape treatment, is forced out of its course and is together with the other gas, directed toward the electrode 2 and thereby subjected to the action of the intense electrical field immediately surrounding the electrode.

Since the insulator 3 does not produce an electrical field, the shield or screen 6 may approach it closely without causing a spark-over.

As an alternative means for the purpose stated I may place an annulus 7 between the collecting electrode 1 and the discharge electrode 2 defining a constriction passage area 8. Instead of employing an insulator link 3, the electrode 2 may be enlarged to increase the surface area, as indicated at 9, and thereby raise the critical point to compensate for the lowering of the critical point incident to the introduction of the ring 7. The gas traveling along the walls of the pipe or chamber 1 is thereby forced inwardly into an intense corona field set up between the enlargement 9 and the ring 7.

While this arrangement may be used in place of the screen 6 and the insulator link 3, it may be used in addition to it, as indicated.

Fig. 2 represents a precipitator of the multiple pipe treater type in which dampers 10 and 11 are placed within treater pipes 12 and 13 for the purpose of automatically equalizing the rate of flow of the gas therein. The dampers 10 and 11, which form part of my invention described in my copending application Ser. No. 193206, filed Sept. 25, 1917, have the form of semi-circular disks of insulating material provided with semi-circular recesses 10' and 11' which separate the dampers from the insulator links 14 and 15 respectively, which interconnect the electrode sections 20 and 21. The dampers, one of which is shown on a larger scale in Fig. 5 may be journaled by means of pivots 22 in the wall of the pipe 12. At one side the pivots 22 project beyond the outer face of the pipes and are connected to crank arms 23 and 24. At the outer ends the crank arms are provided with arms or levers 25 and 26 formed on their upper faces with ribs 27. These ribs serve the purpose of adjustably supporting a weight pocket 28. Like in the device shown in Fig. 1, the insulator links do not produce an electric field and make it feasible to place the dampers within the tube about the electrode. The dampers are preferably placed at the upper end of the pipes to prevent a deposit therein as much as possible.

The insulating link may be placed anywhere in the pipe chamber, its location depending merely on the location of the

dampers or constriction. As shown in Fig. 3 the current is conducted to both sections of the electrode 4' and 5' from a common source, which in the case shown is the secondary 16 of a transformer 17, and is rectified by a rectifier 18.

I claim:—

1. In an electric precipitator the combination of a treater chamber, a constriction in the chamber, a discharge electrode extending through the chamber and the constriction and means on the electrode for preventing a disruptive discharge to said constriction at voltages below the normal critical voltage of the precipitator.

2. In an electric precipitator the combination of a treater chamber having a constricted portion, a discharge electrode extending through the chamber and the constricted portion, and means for making the critical point of disruptive discharge substantially uniform throughout the length of the chamber.

3. In an electric precipitator the combination of a treater chamber, a discharge electrode extending therethrough, means for directing the gas passing through the chamber into regions adjacent the discharge electrode and means for making the critical point of disruptive discharge substantially uniform throughout the chamber.

4. In an electric precipitator the combination of a treater chamber, a discharge electrode extending therethrough, means for constricting the flow of gas adjacent the electrode and means for preventing a disruptive discharge from the discharge electrode to said constricting means at voltages below the normal critical voltage.

5. In an electric precipitator the combination of a treater chamber of substantially uniform cross-section throughout its length, a discharge electrode extending therethrough, means for constricting the flow of gas adjacent the electrode and means for preventing a disruptive discharge from the discharge electrode to said constricting means at voltages below the normal critical voltage.

6. In an electric precipitator the combination of a treater chamber, a discharge electrode extending therethrough, means for constricting the flow of gas adjacent the discharge electrode, said discharge electrode comprising active electrode sections at both sides of the constricting means and an insulator link between said sections adjacent said constriction.

7. In an electric precipitator the combination of a treater chamber, means in said chamber for symmetrically constricting the flow of gas therethrough, discharge electrode sections at both sides of the constricting means and an insulator link for me-

chanically connecting the discharge electrode sections adjacent said constricting means.

5 8. In an electric precipitator the combination of a treater chamber, damping vanes located in said chamber laterally of the axis of the chamber, discharge electrode sections at both sides of the damping vanes and an insulator link between said damping vanes
10 for mechanically connecting the discharge electrode sections.

9. In an electric precipitator the combination of a treater chamber, a discharge

electrode extending through the chamber, a diaphragm symmetrically located about the axis of the chamber, said discharge electrode comprising active sections at both sides of the diaphragm and an insulator extending through the diaphragm aperture for connecting the electrode sections. 15 20

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM W. STRONG.

Witness:

RUTH M. HEFFERFINGER,
G. A. W. STOUTER.