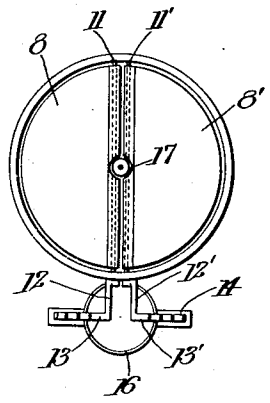
W. W. STRONG.

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

APPLICATION FILED SEPT. 25, 1917.

1,337,488. **Patented Apr. 20, 1920.**

FIG. 2.



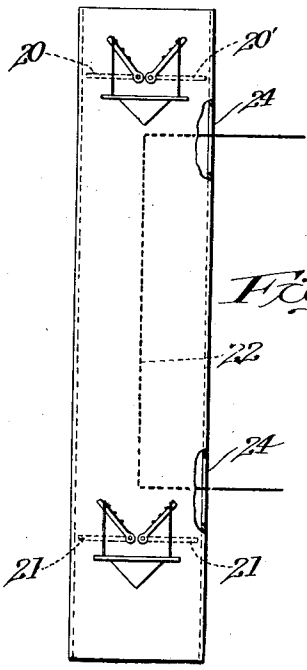


FIG. 3.

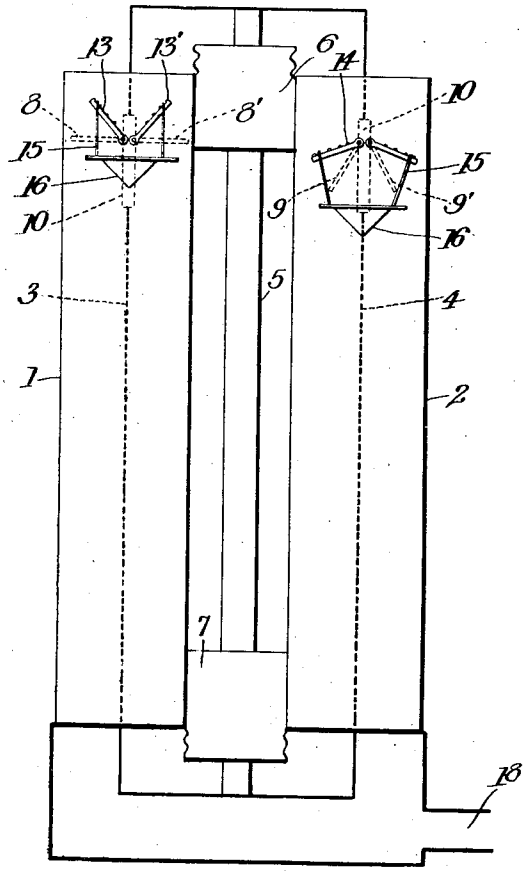
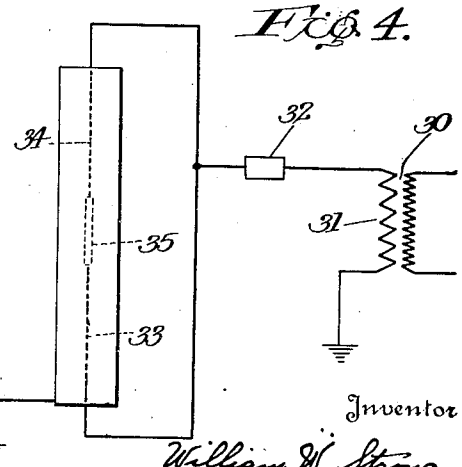


FIG. 1.

FIG. 4.



Witness
G. F. Baker.

Inventor
William W. Strong,

By Byrnes Townsend & Brickenstein,

Attorneys.

UNITED STATES PATENT OFFICE.

WILLIAM W. STRONG, OF MECHANICSBURG, PENNSYLVANIA, ASSIGNOR TO RESEARCH CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

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

1,337,488. Specification of Letters Patent. Patented Apr. 20, 1920.

Application filed September 25, 1917. Serial No. 193,206.

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 and in particular to mechanism for controlling the velocity of the fumes or gases passing through the precipitator.

The capacity of a particular precipitator determines the maximum rate of flow or velocity of a gas to be cleaned. If the gas flows through the treating chamber at a rate greater than such maximum, it cannot be completely cleaned, and the greater the velocity above such maximum, the greater will be the loss of valuable products.

On the other hand, it is found that when gas is passed through a multiple pipe treater, where a plurality of treater pipes are arranged in parallelism to each other, different quantities of gas will pass through the different pipes at different velocities. This difference may be due to various causes, chiefly to differences of temperature caused by local cooling.

Whatever may be the cause, the effect is that the gas is not uniformly treated in the different pipes, that the gas having the greater velocity is not sufficiently cleaned and that on the other hand the treater pipe through which the gas flows at a relatively lower rate is not efficient.

It is the object of my invention to provide means for controlling the velocity of the fumes or gases through treater pipes to avoid the difficulties above referred to.

The invention in its broadest aspect comprises means for variably constricting the flow of gas in a pipe and means for automatically operating these constricting means in proportion to the velocity of the fumes or gases in the pipe.

For a fuller understanding of the invention I refer to the appended drawings in which—

Figure 1 is a view in elevation of a multiple pipe treater embodying my invention;

Fig. 2 is a plan view of a single treater pipe;

Fig. 3 is a view in elevation of a modified form, and

Fig. 4 is a diagrammatic view of the electrical arrangement used in Fig. 1.

Fig. 1 represents a multiple pipe treater composed of the chambers 1 and 2 which form the collecting electrodes. The discharge electrodes 3 and 4 are supported by a beam 5 held in position between the chambers 1 and 2 by insulators 6 and 7. The particular arrangement for supporting the electrodes is not material and may be altered in various ways.

The principal feature of the invention is the damper mechanism comprising the dampers 8, 8′ and 9, 9′. These dampers are in substance semi-circular disks, as best shown in Fig. 2, and of such size that, when they are in a plane transversely of the pipe, they constrict the flow of the gas a maximum amount and when they are in other positions, they constrict the flow of the gas less. The extreme positions are indicated in dotted lines.

In order to make the application of dampers, or constricting means in general, feasible in the manner and for the purpose indicated, I make use of an insulator link 10, more specifically described in my co-pending application Ser. No. 193,207, filed Sept. 25, 1917. This link 10 which is of suitable insulating material, serves the purpose of interconnecting the electrode sections in the pipe without in itself producing an electrical field. The dampers and the insulator link may be located anywhere in the pipe, but I preferably place them near the end of the pipe where the gases leave the precipitator for the reason that the gases are substantially clean when they reach that point and do not form a deposit in the dampers.

The dampers 8, 8′ and 9, 9′ are supported on pivots 11, 11′ journaled in the wall of the pipes. At one side the pivots 11 and 11′ project beyond the outer face of the pipes and are connected to crank arms 12 and 12′. At the outer end the crank arms are provided with arms 13 and 13′ formed on their upper faces with ribs 14. These ribs serve the purpose of adjustably supporting hooks 15 from which a weight pocket 16 is suspended. The dampers have semi-circular

recesses 17 whereby they are spaced from the insulating link 10.

The operation is as follows:

The gas is admitted by the pipe 18. Part of it flows up through pipe 2, while the remainder flows up pipe 1. Assuming that the maximum velocity of the gas according to the capacity of the precipitator is 10 feet per second, the weight attached by means of the weight pockets 16 is such that it will hold the dampers in the open position indicated at the right of Fig. 1. Should the velocity of the fumes in one of the pipes increase, the kinetic energy of the gases will lift the damper vanes against the gravity action of the weights and reduce the effective aperture of the pipe in proportion to the increase of velocity above that for which the dampers had been set. This reduction of the effective aperture will cause an increased flow of gas into the second pipe and increase the velocity thereof in increased proportion to the reduction of the aperture in the first pipe, until a balance is attained in the two pipes and the velocities in the pipes are equal.

By means of the weights the dampers may be set in any manner desired. The dampers in all the pipes may be set for any maximum velocity, or for different velocities to suit particular requirements.

While I have shown weights as a means for controlling the position of the dampers, I may use other suitable means for that purpose and I consider all such means as suitable which yield readily to the kinetic action of the gases on the dampers and tend to return the dampers to their original position.

I have shown means for offering a substantially constant resistance against the kinetic action of the gases to operate the dampers in a substantially linear progression in proportion to the change of velocity. It is of course feasible to constrict the flow of the gas at a rate other than linear so that the ratio

$$\frac{\text{rate of flow}}{\text{rate of constriction}}$$

is a variable, as is obvious.

In Fig. 3, which represents a treater pipe of a multiple pipe treater system, the discharge electrode is not passed through the damper system and no insulator link is needed. The dampers are identical in construction with those shown in Fig. 1. 20, 20′ and 21, 21′ are dampers at opposite ends of the treater pipe. Either one or the other may be used or both concurrently, as may be found desirable. The discharge electrode 22 enters and leaves the treater pipe through lateral apertures 24 and may be supported in any suitable way. The operation of the controlling mechanism is the same as in Fig. 1.

Fig. 4 shows the electrical connection applicable to the structure shown in Fig. 1 or any other structure, where an insulator link divides the electrode in two sections. The current must be passed to both sections to charge the electrode. From a suitable source of supply, as from the secondary 31 of transformer 30 the current passes through a rectifier 32 to sections 33 and 34 of the electrode which are separated in the pipe by the insulator link 35.

I have shown a specific form of dampers as a convenient means for carrying out the object of my invention. The dampers shown perform the dual function of a speed gage for measuring the velocity of the fumes and of a constricting means. I may within the scope of my invention use separate velocity measuring means and separate constricting means suitably interrelated to perform together the function of the dampers shown.

The term "pipe" in the claims is intended to cover passages or ducts of all forms capable of operating for the purpose specified.

I claim:—

1. The combination of an electric precipitator of the multiple pipe treater type and automatically controlled means positioned in the different pipes for equalizing the flow of gas therein.

2. In an electric precipitator of the multiple pipe treater type, means for controlling the flow of gas in each pipe and means for automatically actuating said controlling means for equalizing the flow of gas in the different pipes of the precipitator.

3. In an electric precipitator of the multiple pipe treater type, adjustable damper means in each pipe and means for automatically adjusting said damper to equalize the flow of gas in the different pipes.

4. In an electric precipitator of the multiple pipe treater type, means for automatically constricting the flow of gas in each pipe when the rate of flow exceeds a predetermined value.

5. In an electrical precipitator of the multiple pipe treater type, the combination of a damping vane in each pipe and pivotally supported thereon and means connected to the damping vane for normally holding it in a relatively open position against the action of the gas tending to close it, said means being constructed and arranged to just balance the kinetic action of the gas when the rate of flow has a predetermined value and permit the gradual closing when the rate of flow exceeds the predetermined value.

In testimony whereof I affix my signature.

WILLIAM W. STRONG.