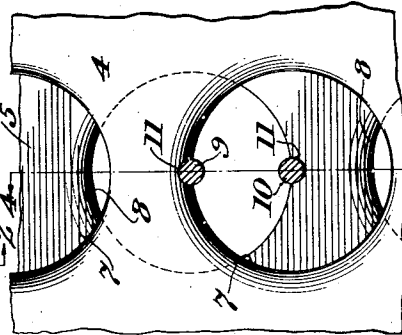
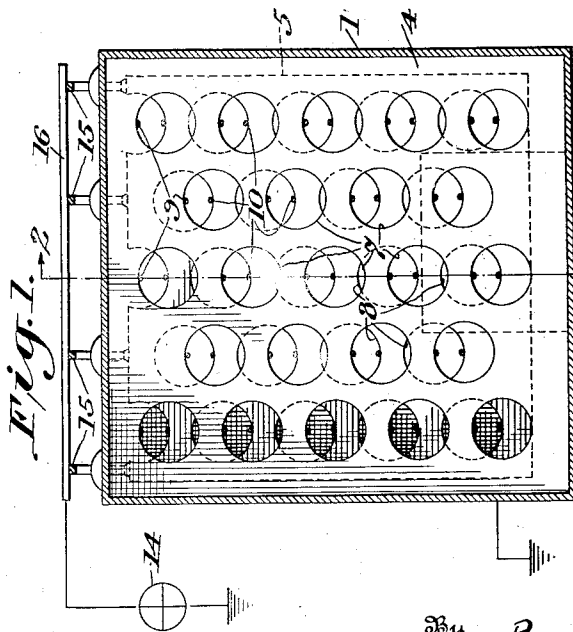
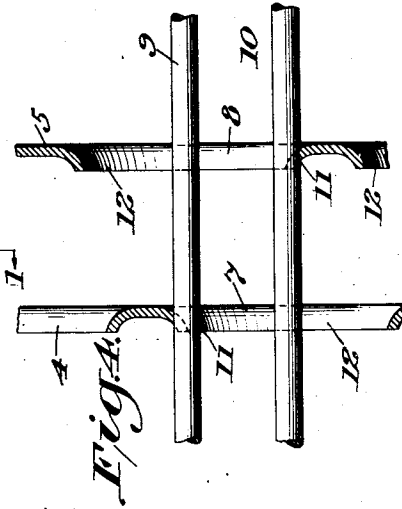
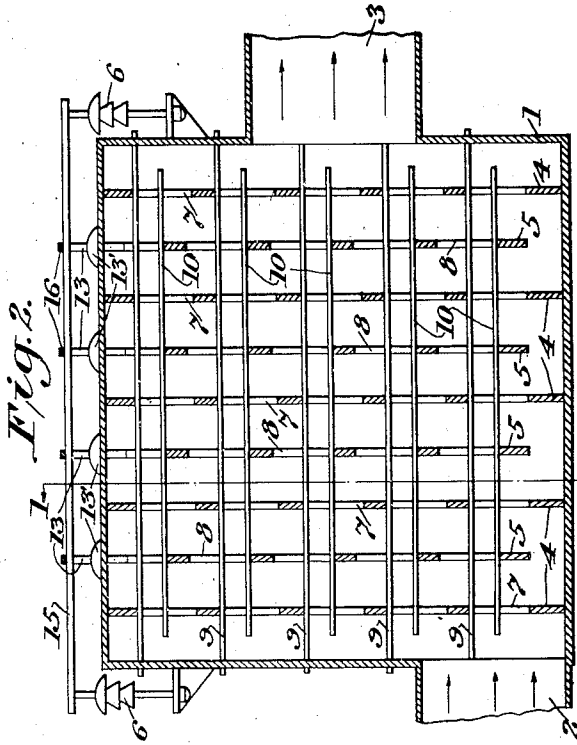


L. BRADLEY.
ORIFICE PRECIPITATOR.
APPLICATION FILED OCT. 31, 1918.

1,344,330.

Patented June 22, 1920.



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LINN BRADLEY, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO RESEARCH CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

ORIFICE-PRECIPITATOR.

1,344,330.

Specification of Letters Patent. Patented June 22, 1920.

Application filed October 31, 1918. Serial No. 280,624.

To all whom it may concern:

Be it known that I, LINN BRADLEY, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Orifice-Precipitators, of which the following is a specification.

The present invention relates to electrical apparatus for the treatment of gases or gaseous mixtures to effect a separation of the gases from solid or liquid particles suspended therein.

It has been found that when gases are passed through a series of alined orifices formed in spaced plates acting as electrodes and are intensively charged from a discharge electrode passing centrally through the orifices, the particles suspended in the gas are propelled toward the edges of the orifices, pass by the edges and settle in the spaces between the plates. This phenomenon has been ascribed to the effect of what is called electrical wind which is due to the rapid motion of the particles under the propelling force of the ions liberated from the discharge electrode. The particles are headed toward the edges of the orifices and acquire considerable momentum as they approach them. Under the effect of this momentum they are carried beyond the edges and pass out of the gas stream directed through the orifices and settle on the plates. Whatever the true theory may be for the phenomenon, this form of precipitator has been found very effective.

It is the object of this invention to construct a precipitator of this type which combines with its electrical advantages compactness, ruggedness and cheapness.

For a fuller understanding of the invention reference is had to the appended drawings in which—

Figure 1 is a vertical section through a precipitator chamber embodying the invention and taken substantially on line 1—1 in Fig. 2;

Fig. 2 a vertical section taken substantially on line 2—2 in Fig. 1; and

Figs. 3 and 4 are views in elevation and section respectively showing the relation of precipitator parts in detail.

In the drawings 1 represents the casing defining the precipitator chamber and 2 and 3 indicate the inlet and outlet respectively

for the gases. In the chamber are positioned at right angle to the direction of gas flow a plurality of plates having orifices. Plates 4 are connected to the casing 1, while plates 5 are electrically separated therefrom and are separately supported by insulators 6 outside the chamber. The orifices 7 in the plates 4 are all in alinement and the orifices 8 in the plates 5 are in alinement, but the orifices 7 and 8 are in staggered relation, being offset relatively to each other by about half their diameter. Rods or wires 9 extend centrally through orifices 8 of plates 5 and rods 10 through orifices 7 of plate 4. The arrangement is such that rods 9 bear upon plates 4 at the highest point of the orifices 7 while the rods 10 bear upon the plates 5 at the lowest points of the orifices 8. Since the plates 4 have the same polarity as the casing 1, the rods 9 may be connected with it as shown in Fig. 2.

In practice I prefer to embed the rods 9 and 10 in notches or recesses 11 in the plates 4 and 5 respectively as clearly indicated in Figs. 3 and 4. In this manner the rods may serve as spacers for the plates. The plates 4 and 5 may be made of sheet metal and so perforated as to form lips 12 which will tend to direct precipitated material along the electrode surface and between the plates.

From an external source 14 voltage is applied to the electrode elements 5 and 10 through the bus bars 15 and 16 which are supported upon insulators 6 and through conducting rods 13 insulated from the casing 1 by insulators 13' and an electrical discharge between the electrode elements 5 and 10 and the opposing electrode consisting of the elements 4 and 9 takes place, the latter being connected to ground as shown. A current of gas enters the treater at the inlet 2, passes through the orifices transversely of the electric discharge and out through the outlet 3. Particles suspended in the gas, as they pass through the orifices, are subjected to an intense ionizing action, thereby driven toward the edges of the orifices and settle on the plate electrodes whence they are caused to descend to the bottom of the treater either by gravity or suitable knocking means. The precipitated material may be removed, in any suitable manner.

In the operation of the apparatus as described, both the rods 9 and the rods 10 would act as discharge electrodes and the

gaseous stream would be subjected to an electric discharge of alternating polarity. Since the critical voltage is lower when the charge is positive than when it is negative, the orifices 8 must be made in practice somewhat larger than the orifices 7, assuming that the bus-bars 15 are connected to the negative side of a D. C. source.

If it is desired to have discharge of one polarity only, the perimeters of the orifices 8 are so designed as to discharge to the rods 9.

It is understood that the spacing of the plates and the size of the openings depends entirely on the voltage of the source applied and the character of the gases treated. Various minor changes may be made within the scope of the invention.

While the openings in the two groups of plates 4 and 5 are shown as circular, they may of course be formed differently.

I claim:

1. The combination with a treater chamber, of two plates spaced apart in parallelism, each plate having an orifice which is laterally offset relatively to the other and a rod connected to each plate and extending substantially centrally through the orifice in the other plate.

2. The combination with a treater chamber, of two plates spaced apart in parallelism, each plate having a plurality of uniformly spaced orifices which are laterally offset relatively to the orifices in the other plate and a plurality of rods connected to each plate and extending substantially centrally through the orifices in the other plate.

3. The combination with a treater chamber, of a plurality of plates spaced apart in parallelism, each plate having a plurality of uniformly spaced orifices, the orifices in alternate plates being laterally offset relatively to the orifices in the other plates and a plurality of rods connected to each of the two groups of plates and extending substantially centrally through the orifices in the other group.

4. The combination with a treater chamber, of two plates spaced apart in parallel-

ism, each plate having an orifice which is laterally offset relatively to the other, a rod connected to each plate and extending substantially centrally through the orifice in the other plate, one plate contacting with the walls of the chamber and the other being electrically insulated from the chamber and means for connecting the insulated plate to one pole of a source of electric current and the chamber walls to the other pole.

5. The combination with a treater chamber having a gas inlet and an outlet, of a plurality of plates spaced apart transversely of the direction of gas flow, each plate having a plurality of uniformly spaced orifices, the orifices in alternate plates being laterally offset relatively to the orifices in the other plates, a plurality of rods connected to each of the two groups of plates and extending substantially centrally through the orifices in the other group and means for connecting one group of plates to one pole of a source of electric current and the other group to the other pole.

6. The combination with a treater chamber having a gas inlet and an outlet, of a plurality of plates spaced apart transversely of the direction of gas flow, each plate having a plurality of uniformly spaced orifices, the orifices in alternate plates being laterally offset relatively to the orifices in the other plates, a plurality of rods connected to each of the two groups of plates and extending substantially centrally through the orifices in the group, the plates belonging to one group being in contact with the chamber walls and the plates belonging to the other group being spaced from the chamber walls, means insulated from the walls of the chamber for supporting the said spaced plates from without and for conducting current thereto.

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

LINN BRADLEY.

Witnesses:

A. M. MOONEY,

J. HUFF.