T. E. MURRAY & C. B. GRADY.

DEVICE FOR TRAPPING PARTICLES IN SUSPENSION IN GAS CURRENTS.

APPLICATION FILED MAR. 28, 1914.

1,132,677. Patented Mar. 23, 1915.

2 SHEETS—SHEET 1.

Fig. 1

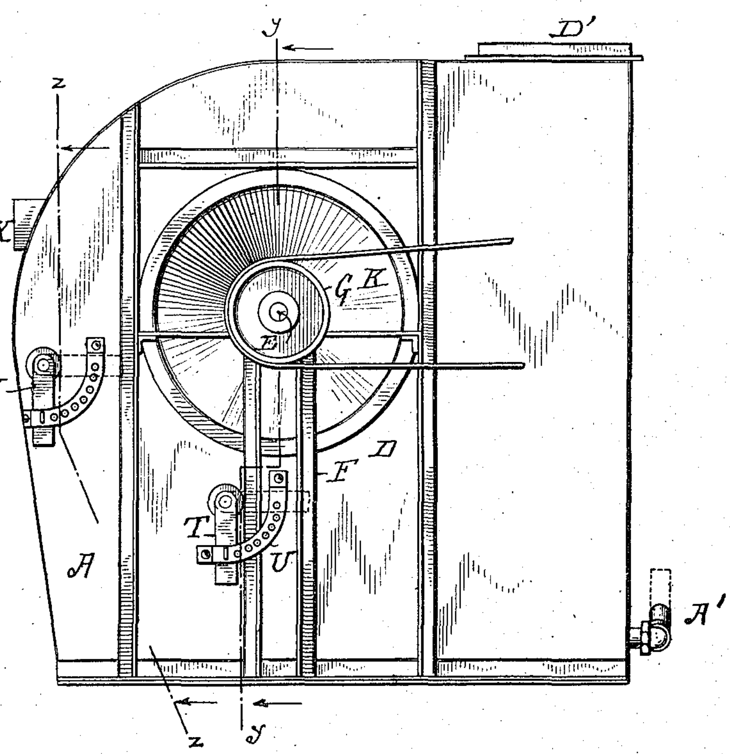
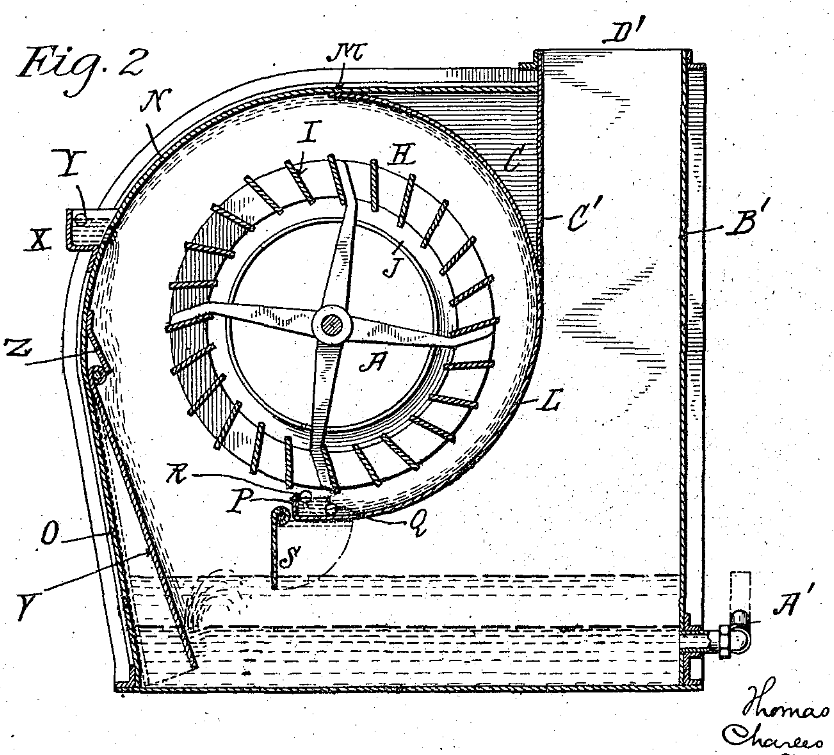


Fig. 2



Witnesses:
May T. McGarry
Pauline M. Abel

Thomas E. Murray
Charles B. Grady
Inventors

By their Attorney Park Benjamin

T. E. MURRAY & C. B. GRADY.

DEVICE FOR TRAPPING PARTICLES IN SUSPENSION IN GAS CURRENTS.

APPLICATION FILED MAR. 28, 1914.

1,132,677.

Patented Mar. 23, 1915.

2 SHEETS—SHEET 2.

Fig. 3

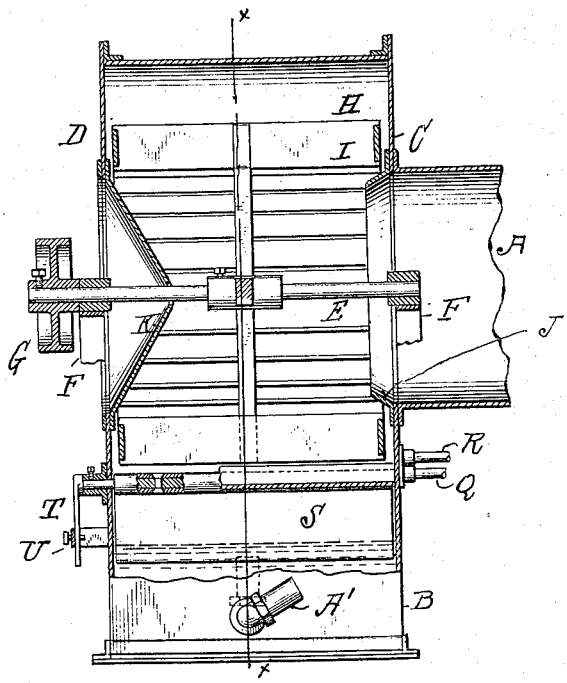
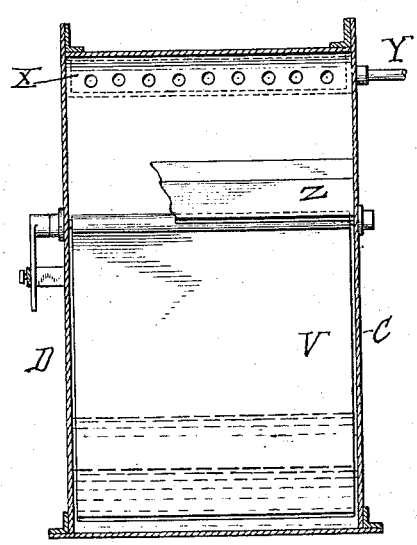


Fig. 4



Witnesses:
May F. McGarry
Pauline M. Abel

Thomas E. Murray
Charles B. Grady
Inventors
By their Attorney Paul Lemmon

UNITED STATES PATENT OFFICE.

THOMAS E. MURRAY AND CHARLES B. GRADY, OF NEW YORK, N. Y.; SAID GRADY ASSIGNOR TO SAID MURRAY.

DEVICE FOR TRAPPING PARTICLES IN SUSPENSION IN GAS-CURRENTS.

1,132,677. Specification of Letters Patent. Patented Mar. 23, 1915.

Application filed March 28, 1914. Serial No. 827,864.

To all whom it may concern:

Be it known that we, THOMAS E. MURRAY and CHARLES B. GRADY, citizens of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Devices for Trapping Particles in Suspension in Gas-Currents, of which the following is a specification.

The object of the invention is to entrap solid particles entrained with and suspended in a gas current.

Our invention embodies a novel principle, namely, to project the current to be cleansed upon an inclined plate constructed at its lower end so as to retain over a portion of its area liquid delivered thereon, whereby said liquid by reason of the impact of the current upon its surface is caused to spread and flow in a continuous sheet or film over said plate, which sheet receives and traps the particles in said current. In the particular embodiment herein disclosed, the current is delivered in a series of jets from the periphery of a rotary outward radial flow fan wheel, and the plate is made substantially circular to inclose said wheel, so that the impact of the current with the liquid sheet occurs at many points on the liquid sheet, and the flow of said sheet is thus accelerated. Preferably, the plate is made in volute form, with its liquid receiving portion below and most nearly placed to the wheel periphery. The gas current and liquid after traversing the said plate, passes to an outlet duct disposed below said plate and above a body of liquid in a receptacle at the bottom of the casing, and is projected downwardly from said outlet upon the surface of the liquid in said casing, thus subjecting the gas current to a second purification by reason of the trapping of the remaining particles therein by the liquid in said receptacle. The duct may be constructed so that the cross sectional area of its outlet opening may be varied, and means may also be provided for varying the distance of the liquid level in said receptacle from said opening, the device in these particulars embodying the principle and a construction in accordance therewith, which is fully set out in U. S. Patent No. 1,073,621, granted to Thomas E. Murray, September 23, 1913.

In the accompanying drawings—Figure 1 is a side elevation of our apparatus. Fig. 2 is a section on the line x, x of Fig. 3. Fig. 3 is a section on line y, y of Fig. 1. Fig. 4 is a section on line z, z of Fig. 1.

Similar letters of reference indicate like parts.

A is a flue leading from any source of gas current, from which current it is desired to remove solid particles in suspension.

B is a casing of sheet metal, having an opening in its side wall C communicating with said flue, and a similar opening in its opposite side wall D.

E is a shaft extending through said openings and journaled in bearings on fixed standards F. On said shaft is a driving pulley G.

H is an outward radial flow fan wheel, having inclined vanes I and fixed on shaft E. One end of the wheel is open and receives the tapering duct J which is secured on the inner side of wall C surrounding the inlet opening therein. A conical shield K, secured on the opposite inner side of wall B, enters the opposite end of wheel H and closes the opening in said wall around shaft E.

Within the casing B is a fixed curved plate forming a partition L extending from side wall C to side wall D. The wheel H is preferably eccentrically placed with reference to said partition, so that the distance between its inner surface and the circumference of wheel H gradually increases from the lower to the upper end of said partition. The upper end of the partition meets the casing wall M which is first suitably curved at N to continue the curvature of the partition and then at O becomes preferably straight and inwardly inclined and so continues to the bottom of the casing. The partition L, together with the walls of the casing, may form a substantially circular compartment, or, preferably and as shown in Fig. 2, one of approximately volute form, inclosing wheel H. The lower end of volute partition L has an upwardly turned flange P forming a dam entering the wall of the casing and over said flanged end are two pipes Q, R. Pipe Q delivers liquid upon said partition, and pipe R is an overflow pipe for conducting away said liquid af-

ter it has risen to a certain height in the receptacle formed by side walls B, C, dam P and the lower portion of partition L.

Within the casing and just in front of dam P is a swinging plate S, which extends from wall B to wall C. The shaft of said plate after passing through wall D has an arm T which may be used to set said plate at any desired angle between vertical and horizontal, as indicated in Fig. 2, and then be fixed in place by a pin entering the perforated quadrant U. Another swinging plate V, also extending from wall B to wall C, has its upper edge disposed preferably at the top of the straight inclined portion O of wall M, and is carried on a shaft which extends through wall D, and is provided with an adjusting arm W and quadrant for fixing said plate at a desired angle. On the outside of the curved portion N of wall M is a gutter X receiving liquid through pipe Y and delivering same through openings in said wall to a flashing Z, whence the streams pass upon partition V and so downwardly to the receptacle W formed in the lower portion of the casing below wheel H. The liquid level in said receptacle may be regulated by the pivoted overflow nozzle A'. The vertical wall B', together with the partition C', form the outlet duct D' for the cleaned gas.

In operation, the gas from the inlet entering wheel H passes radially outward through the spaces between the suitably inclined vanes upon the liquid retained by the dam P at the lower part of partition L and sweeps said liquid as indicated by dotted lines, Fig. 2, as a sheet or film around the inner surface of said partition and casing. As the current escapes as jets from between the vanes, it impinges on said sheet at many points, and thus retains it in sheet form, besides accelerating its motion. The jets are projected centrifugally upon the liquid sheet with much force, thus driving the solid particles into the sheet, where they become entrapped. The sheet receives an additional liquid supply from gutter Y. The gas and liquid pass between the swinging plates V, S, and are projected from the lower outlet of the duct formed by said plates and the side walls C, D of the casing, upon the surface of the liquid in the lower part of the casing. In this body of liquid, any remaining particles in the gas become entrapped, and the purified gas finally escapes at outlet duct D'.

By varying the inclination of swinging plates V, S, we vary the cross sectional area of the outlet, and hence the velocity of the gas current, as fully set out in said Murray patent.

The liquid used may be water.

The apparatus is adapted to many purposes, such as the cleaning of boiler or blast furnace gas, the purification of air used in ventilation, or for cooling, heating or moistening said air.

We claim:

1. A device for trapping particles in suspension in a gas current, comprising a plate, means for retaining liquid thereon to submerge said plate over a predetermined portion of its area, and means for projecting said current upon said liquid: whereby said liquid is caused to flow as a sheet over the normally unsubmerged area of said plate and said particles to engage in said liquid sheet.

2. A device for trapping particles in suspension in a gas current, comprising a curved plate, dams at the lower edge and at the side edges of said plate forming with said plate a receptacle for liquid partly submerging the same, and means for projecting said current upon said liquid: whereby said liquid is caused to flow as a sheet over the normally unsubmerged area of said plate and said particles to engage in said liquid sheet.

3. A device for trapping particles in suspension in a gas current, comprising a curved plate, means for retaining liquid thereon to submerge said plate over a predetermined portion of its area, and means for projecting said current in a plurality of jets upon said retained liquid and the normally unsubmerged area of said plate: whereby said liquid is caused to flow as a sheet over said plate and said particles to engage in said liquid sheet.

4. A device for trapping particles in suspension in a gas current, comprising a casing, having inlet and outlet openings for said current, an imperforate volute partition extending transversely across said casing, a dam on the lower transverse edge of said partition for retaining liquid thereon to submerge said partition over a predetermined portion of its area, and an outward radial flow rotary fan wheel, disposed in the concavity of said partition, communicating internally with said current inlet and delivering said current upon said partition.

5. A device for trapping particles in suspension in a gas current, comprising a casing having an inlet and an outlet, a curved partition extending across said casing, means for retaining liquid on said partition to submerge a predetermined portion of the area thereof, means for projecting said current upon said liquid, whereby said liquid is caused to flow as a sheet over the normally unsubmerged area of said partition and said particles to engage in said liquid sheet, a liquid receptacle at the bottom of said casing, and a duct in said casing interposed between said receptacle and said plate and delivering said liquid and gas current upon the surface of the liquid in said receptacle.

6. A device for trapping particles in suspension in a gas current, comprising a casing having an inlet and an outlet, a curved partition extending across said casing, means for retaining liquid on said partition to submerge a predetermined portion of the area thereof, means for projecting said current upon said liquid, whereby said liquid is caused to flow as a sheet over the normally unsubmerged area of said partition and said particles to engage in said liquid sheet, a liquid receptacle at the bottom of said casing, a duct in said casing interposed between said receptacle and said plate and delivering said liquid and gas current upon the surface of the liquid in said receptacle, and means for varying the cross sectional area of the delivery orifice of said duct.

7. A device for trapping particles in suspension in a dry current, comprising a casing having an inlet and an outlet for said current, a stationary inclined curved plate in said casing, means for independently delivering a liquid stream upon said plate, and a rotary outward radial flow fan wheel in said casing communicating internally with said current inlet and delivering said current upon the surface of the liquid stream independently delivered upon said plate.

8. A device for trapping particles in suspension in a dry gas current, comprising a substantially circular casing having an inlet for said current and an outlet for current and liquid jointly and having side walls and a circumferential wall united thereto, there being an inlet for liquid in said circumferential wall, and a rotary outward flow fan wheel disposed in said casing communicating internally with said current inlet and delivering said current upon the layer of liquid formed upon said circumferential wall between said liquid inlet and said joint outlet.

9. A device for trapping particles in suspension in a gas current, comprising a casing having an outlet for the purified current, a substantially circular compartment in said casing having an inlet for the gas current to be purified, a rotary outward radial flow fan wheel disposed in said compartment and communicating internally with said current inlet and delivering said current upon the inner surface of said compartment, means for independently delivering liquid upon said compartment surface, an outlet duct from said compartment disposed below said wheel, and a receptacle in said casing disposed below said compartment outlet duct for containing liquid to receive the discharge projected from said compartment outlet and communicating with said casing.

10. A device for trapping particles in suspension in a gas current, comprising a casing, a substantially circular compartment therein having an inlet for said current, means for delivering liquid upon the inner surface of said casing, a rotary outward radial flow fan wheel disposed in said casing, communicating internally with said current inlet and delivering said current upon said casing surface, an outlet duct from said compartment disposed below said wheel, means for varying the cross sectional area of said duct, and a liquid receptacle in said casing receiving the discharge projected from said outlet duct.

11. A device for trapping particles in suspension in a gas current, comprising a casing having an inlet and an outlet for said current, an outward radial flow rotary fan wheel journaled in said casing and internally communicating with said current inlet, a partition in volute form extending transversely across said casing, partly surrounding said wheel and having its lower edge below and nearest to said wheel, an upwardly turned flange on said edge, and means for delivering water into the receptacle formed by said side walls, partition and edge.

12. A device for trapping particles in suspension in a gas current, comprising a casing having an inlet and an outlet for said current, an outward radial flow fan wheel journaled in said casing and internally communicating with said current inlet, a partition in volute form extending transversely across said casing and partly surrounding said wheel and having its lower edge below and nearest to said wheel, an upwardly turned flange on said edge, a receptacle for water below said wheel, a transverse swinging partition on said casing suspended at its upper edge in proximity to said partition flange, and a second swinging partition in said casing disposed opposite said first partition and suspended in proximity to the peripheral wall of said casing.

In testimony whereof we have affixed our signatures in presence of two witnesses.

THOMAS E. MURRAY.
CHARLES B. GRADY.

Witnesses:
GERTRUDE T. PORTER,
MAY T. MCGARRY.