W. M. ROBERTSON.

DUST COLLECTOR.

APPLICATION FILED JUNE 15, 1916.

1,211,235.

Patented Jan. 2, 1917.

2 SHEETS—SHEET 1.

Fig. 1.

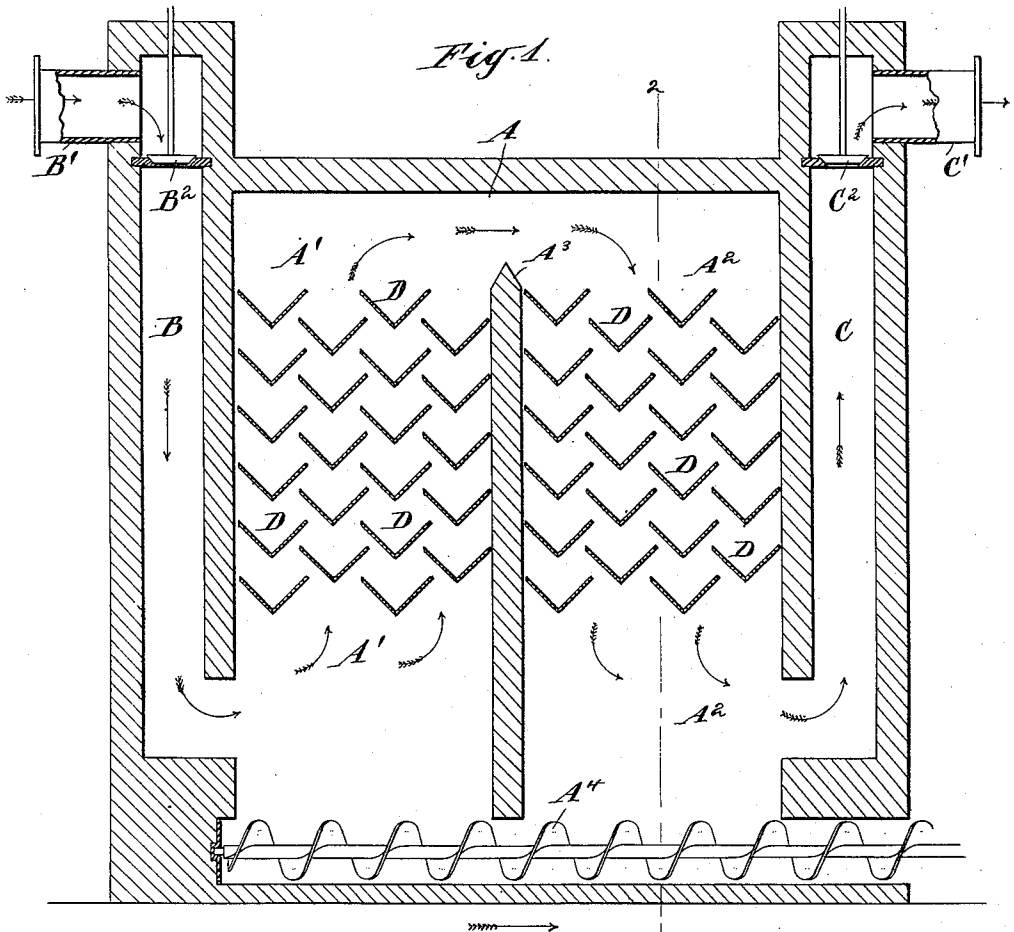
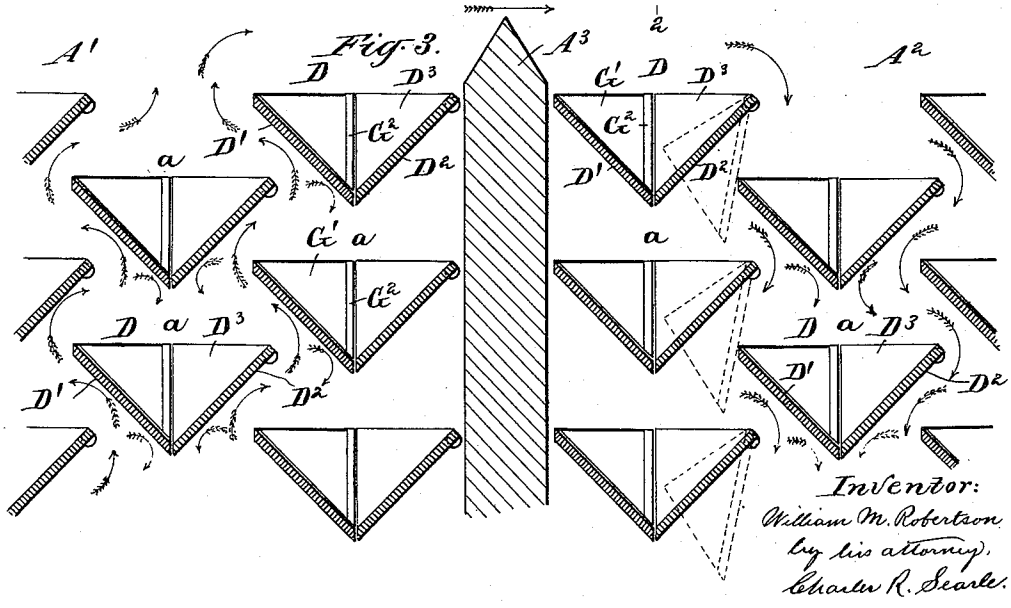


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 2.

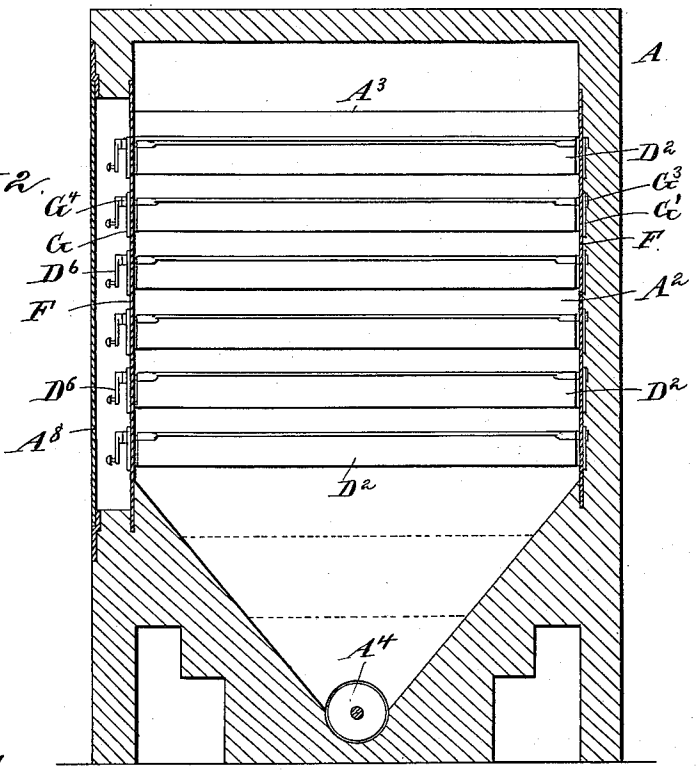


Fig. 4.

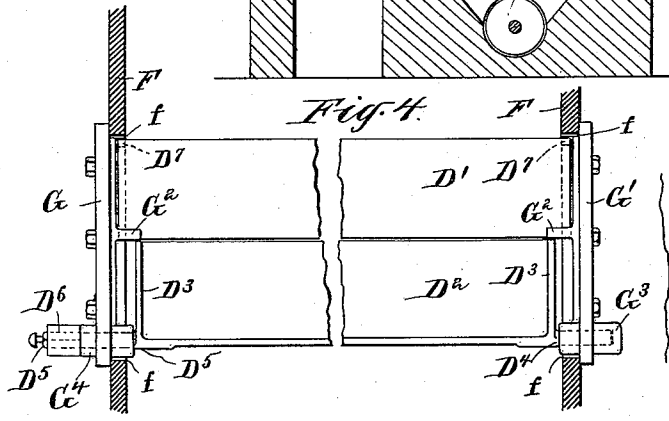


Fig. 6.

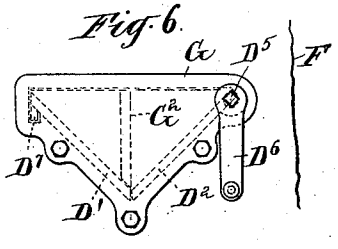


Fig. 5.

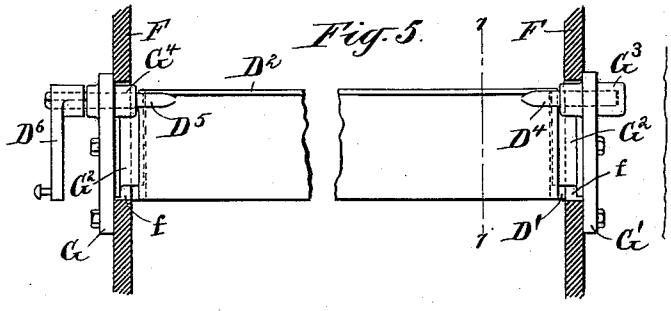
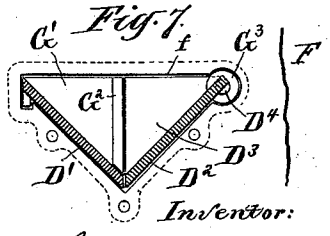


Fig. 7.



Inventor:

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UNITED STATES PATENT OFFICE.

WILLIAM M. ROBERTSON, OF BROOKLYN, NEW YORK.

DUST-COLLECTOR.

1,211,235. Specification of Letters Patent. Patented Jan. 2, 1917.

Application filed June 15, 1916. Serial No. 103,706.

To all whom it may concern:

Be it known that I, WILLIAM M. ROBERTSON, a citizen of the United States, residing in the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Dust-Collectors, of which the following is a specification.

The invention relates to apparatus for separating and arresting dust from air or gas currents, and is designed more particularly for service in arresting and removing ore-dust from the gases in their travel from the furnace to the acid chambers in the manufacture of sulfuric acid.

The object of the invention is to provide an efficient apparatus, economically constructed and operated, through which the current is slowly led and so subdivided and baffled in its travel as to form a succession of "dead" spaces or pockets in which the gas lies practically motionless and favorably conditioned to permit the particles held in suspension to settle in open receptacles located in such relation to the dead spaces as to receive and retain the dust.

A further object is to provide receptacles of such shape and arrangement as to themselves serve as baffles in producing the dead spaces, and another important object is to provide convenient and easily operated means for emptying such receptacles and removing the accumulated dust from the apparatus.

The invention consists in certain novel features of construction and arrangement by which the above objects are attained, to be hereinafter described and claimed.

The accompanying drawings form a part of this specification and show an approved form of the invention.

Figure 1 is a vertical longitudinal section through a dust chamber of a sulfuric acid plant, constructed in accordance with the invention. Fig. 2 is a corresponding transverse section, taken on the line 2—2 in Fig. 1, and partly in elevation. The remaining figures are on a larger scale. Fig. 3 is a vertical section through portions of two groups of receptacles, corresponding to a portion of Fig. 1. Fig. 4 is a plan view of one of the receptacles, partly in horizontal section. Fig. 5 is a corresponding elevation, partly in vertical section. Fig. 6 is an end view of the same. Fig. 7 is a vertical transverse section taken on the line 7—7 in Fig. 5, and partly in elevation.

Similar letters of reference indicate the same parts in all the figures.

A is a dust chamber receiving gas from a furnace, not shown, through a connection B^1 and vertical passage B controlled by a valve B^2, which delivers the gas at a low point in the chamber. After traversing the latter the gas escapes from a low point therein into a vertical passage C controlled by a valve C^2, and thence through the connection C^1 to the acid chamber, not shown, or other portion of the plant. Any parts of the dust chamber not represented may be understood to be as usual.

The chamber A is divided by a wall A^3 into portions A^1, A^2, communicating with each other at the top of the chamber above the wall or partial partition A^3. At the bottom the side walls of the chamber converge downwardly to a screw-conveyer A^4, extending through the partition A^3, arranged to be revolved by any suitable means, not shown, and carry away any dust received at the bottom of the chamber.

It will be noted that the two portions of the chamber are each of very much greater area than the inlet and outlet passages B and C so that the movement of the dust laden gas current is correspondingly reduced in its upward traverse through the portion A^1 of the chamber and its downward passage through the portion A^2, thus affording quiet conditions favorable to the deposition of the dust.

In each portion of the chamber is a group of receptacles or open topped troughs D of angular cross-section, as shown, extending the full width of the interior of the chamber and arranged in vertical rows or series, the troughs of one series in staggered relation to the next adjacent, and the side margins of each trough overlapping those of the next below and themselves overlapped by the next above, as clearly shown in Fig. 3. The slowly moving gas is compelled to travel the divided tortuous paths provided by the spaces between the troughs, the inclined exterior side faces of the latter serving as angular baffles.

The paths followed by the ascending gas in the portion A^1 and the descending currents in the portion A^2 are indicated by the arrows in Fig. 3, and it will be seen that in

and above each trough is a dead space, marked at *a*, in which the movement is extremely slow and favorable to the deposition of dust in the trough. The multiplicity of such pockets offers sufficient opportunity for arresting the dust and when the latter has once settled in the troughs it is completely out of the current and lies undisturbed until removed.

Each trough comprises a relatively fixed side plate D^1 and a movable side plate D^2, the latter hinged by trunnions D^4 D^5 at the upper edge and arranged to be swung outwardly from the fixed plate. When the lower edges of the two plates are together they form an open-topped trough of triangular section, and when the movable plates of any vertical series are swung, as indicated by the dotted lines in Fig. 3, a clear vertical channel is offered through which the dust collected in that series may fall directly to the bottom of the chamber and to the conveyer A^4.

On the interior of the side walls of the chamber are lining plates F F each having openings *f f* covered by castings G G^1 adapted to support the side plates D^1 D^2 of the troughs. Each casting has a vertical rib G^2 on its inner face serving as a stop for the adjacent wing D^3 formed on the ends of each movable side plate D^2, and each casting G^1 has a boss G^3 receiving the adjacent trunnion D^4 on such plate. The casting G has a similar boss G^4 but the latter is open at the outer end and the trunnion D^5 projects therethrough and is squared to receive a crank D^6 by which the movable plate D^2 may be swung or oscillated from and to the fixed plate.

Each fixed plate D^1 is supported at each end in the castings G G^1 and is formed with spurs or hooks D^7 D^7 engaged in corresponding recesses in the castings to hold it in fixed relation to the movable plate.

It will be observed that each movable plate may swing in an arc determined by its stop G^2 in one direction and the fixed plate D^1 of the adjacent trough of the next series, in the opposite direction, as illustrated by the dotted lines in Fig. 3, and by successive oscillations of the movable plates against such stop and plate, all are effectively jarred and any "dust-bridges" broken, and the dust caused to descend. The valves B^2 C^2 are closed, as shown in Fig. 1, during this emptying operation to prevent the escape of dust through the passages B and C, and remain closed until the chamber is cleaned and any remaining dust has again settled.

By removing the outer cover-plate A^8 access is had to the castings G and by the removal of such castings broken or worn side-plates D^1 D^2 may be readily removed and new ones substituted with little labor or loss of time.

The number and arrangement of the troughs may be varied, or their angularity modified, and other means may be employed for their support, and for the removal of the dust accumulated therein. The chamber may be equipped with several groups of troughs and arranged to cause the current to traverse them successively, or the chamber and troughs may be arranged to serve for a single long traverse.

I claim:—

1. In an apparatus of the character set forth, a chamber, and a group of open-topped receptacles therein arranged in staggered relation, with the margins of each receptacle overlapping the adjacent margins of the pair of receptacles next below, said receptacles having upwardly divergent side-faces, whereby dust-laden currents between said receptacles are deflected by such side-faces to produce a dead space in and above each of said receptacles and permit dust to settle undisturbedly in the latter and means for opening and closing each of said receptacles at the lower portion thereof to discharge dust thus collected therein.

2. In an apparatus of the character set forth, a chamber, and a group of trough-like receptacles therein each extending from side to side thereof, arranged in staggered relation with the margins of each receptacle overlapping the adjacent margins of the pair of receptacles next below, said receptacles having upwardly divergent side-faces, whereby dust-laden currents between said receptacles are deflected by such side-faces to produce a dead space in and above each of said receptacles and permit dust to settle undisturbedly in the latter and means for opening and closing each of said receptacles at the lower portion thereof to discharge dust thus collected therein.

3. In an apparatus of the character set forth, a chamber, and a group of V-shaped troughs therein extending from side to side thereof and arranged in staggered relation, with the margins of each trough overlapping the adjacent margins of the pair of troughs next below, whereby dust-laden currents between said troughs are deflected by the upwardly divergent side-faces of said troughs to produce a dead space in and above each trough and permit dust to settle undisturbedly in the latter and means for opening and closing each of said troughs at the lower portion thereof to discharge dust thus collected therein.

4. In an apparatus of the character set forth, a chamber, and a group of receptacles therein arranged in staggered relation to each other, each having upwardly divergent side-plates, and one of said side-plates movable from the other to permit the contents of said receptacle to fall.

5. In an apparatus of the character set

forth, a chamber, and a group of receptacles therein, each having upwardly divergent side-plates, and one of said side-plates movable from the other.

6. In an apparatus of the character set forth, a chamber, a group of V-shaped troughs arranged therein in a plurality of vertical series, each trough having upwardly divergent side-plates, one movable from the other, and means for moving said movable side-plates to provide a continuous channel through such series for discharging the contents of such series.

7. In an apparatus of the character set forth, a chamber, a group of V-shaped troughs therein arranged in staggered relation in a plurality of vertical series, each trough having upwardly divergent side-plates, one movable from the other, said movable side-plates of each series arranged one above the other, and means for moving said movable side-plates to provide an unobstructed vertical discharge channel through such series for the contents of the troughs forming such series.

8. In an apparatus of the character set forth, a chamber, a group of V-shaped troughs therein, each having upwardly divergent side-plates, one of said side-plates mounted to swing from the other to open said trough, a stop for such movable side-plate in the closed position, and means for swinging such movable side-plate in one direction into jarring contact with an adjacent trough, and in the other direction into jarring contact with said stop.

9. In an apparatus of the character set forth, a chamber having side walls, a series of troughs in said chamber extending from one side wall to the other, each trough comprising a fixed plate supported by such walls, and a movable plate pivotally mounted in such walls to swing toward and from said fixed plate, and means for swinging said movable plate.

10. In an apparatus of the character set forth, a chamber having side walls, lining plates on the interior faces of such walls and having apertures therein, a series of troughs in said chamber, each comprising a fixed plate received and supported in such apertures, and a movable plate pivotally mounted in such apertures to swing toward and from said fixed plate, and means for swinging said movable plate.

11. In an apparatus of the character set forth, a chamber having side walls, a series of troughs extending from side to side therein, each comprising a fixed plate mounted in said walls, and a movable plate, trunnions on the ends of said movable plate, sockets on said side walls receiving said trunnions, and a crank on one of said trunnions whereby the said movable plate may be swung in said sockets.

12. In an apparatus of the character set forth, a chamber having side walls, lining plates on the interior faces of the latter, a series of troughs extending from one lining plate to the other, each trough comprising a fixed plate mounted in said lining plates, and a movable plate, trunnions on said movable plate, sockets on said lining plates receiving said trunnions, a crank on one of said trunnions whereby said movable plate may be swung in said sockets, and a removable cover plate on the exterior face of one of said side walls to permit access to said cranks.

In testimony that I claim the invention above set forth I affix my signature.

WILLIAM M. ROBERTSON.