

June 8, 1937.

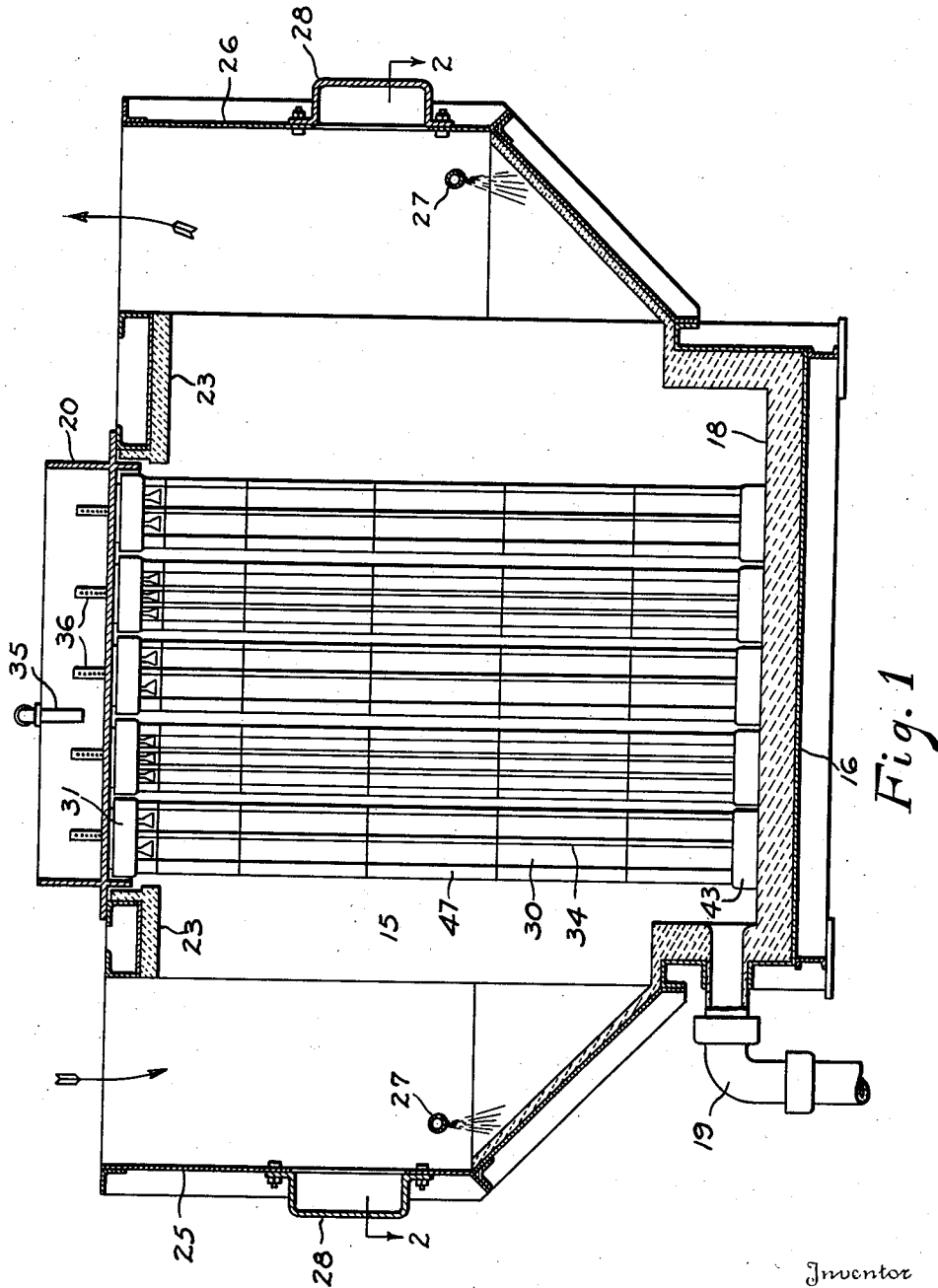
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2,083,468

GAS SCRUBBER

Filed Feb. 7, 1936

3 Sheets-Sheet 1



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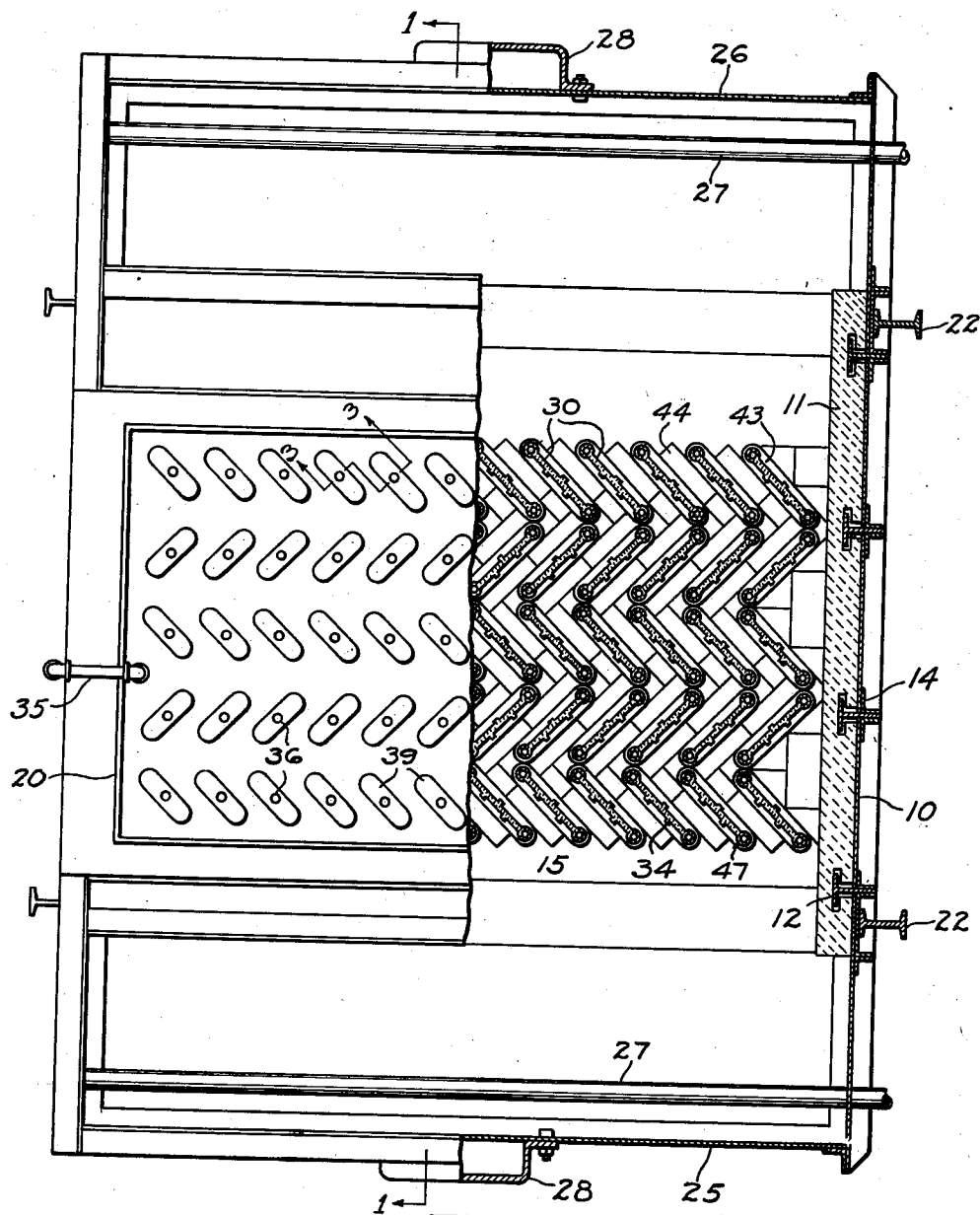


Fig. 2

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3 Sheets-Sheet 3

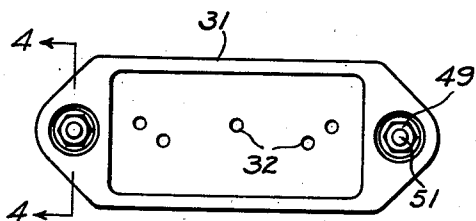


Fig. 5

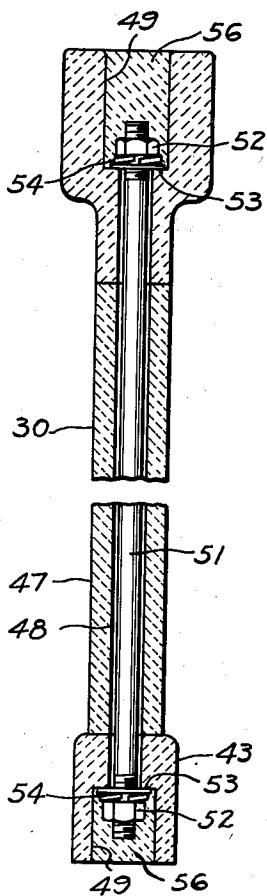


Fig. 4

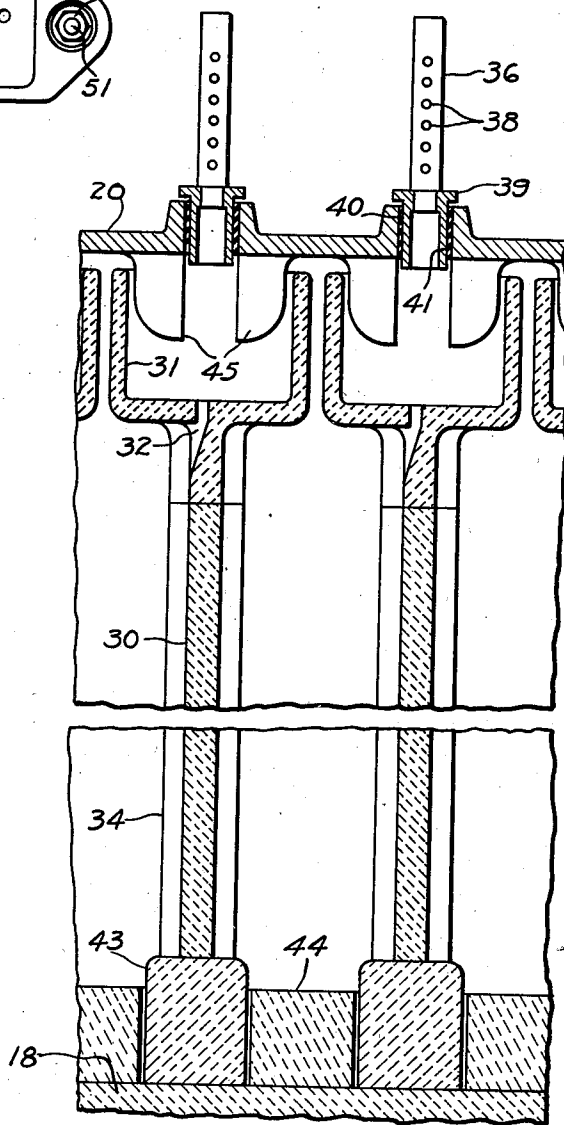


Fig. 3

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UNITED STATES PATENT OFFICE

2,083,468

GAS SCRUBBER

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Application February 7, 1936, Serial No. 62,794

6 Claims. (Cl. 261—112)

This invention relates to gas scrubbers, and more particularly to scrubbers of the wet type having deflecting members located in a gas passage and supplied with water or other suitable liquid.

Apparatus of this type is frequently utilized for cleaning the flue gases discharged from steam boiler furnaces. Such gases usually contain oxides of sulphur, and these oxides are highly corrosive in the presence of moisture. As a result, deflecting members of the type heretofore constructed have had a comparatively short life. Attempts to solve the problem have been complicated by the fact that the gases entering the scrubber are at an elevated temperature. The water which flows over the deflecting members normally keeps them cool, but there is a possibility that the water supply might fail and under such circumstances the deflecting members would be subjected to comparatively high temperatures.

It is accordingly one object of the invention to provide a deflecting member for gas scrubbers of the wet type which will be free from difficulties caused by corrosion.

It is a further object of the invention to provide a deflecting member for gas scrubbers of the wet type which will operate satisfactorily with high temperature gases of a corrosive nature.

It is a further object of the invention to provide a deflecting member for gas scrubbers of the wet type which will be simple and inexpensive to manufacture, and thoroughly reliable in operation.

With these and other objects in view, as will be apparent to those skilled in the art, the invention resides in the combination of parts set forth in the specification and covered by the claims appended hereto.

Referring to the drawings illustrating one embodiment of the invention, and in which like reference numerals indicate like parts,

Fig. 1 is a longitudinal section through a gas scrubber, the section being taken on the line 1—1 of Fig. 2;

Fig. 2 is a top plan view of the scrubber, shown in partial section on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged section on the line 3—3 of Fig. 2;

Fig. 4 is a section on the line 4—4 of Fig. 5; and

Fig. 5 is a top plan view of one of the deflecting plates.

The embodiment illustrated comprises a pair of spaced vertical wall structures formed of metal plates 10 lined with refractory material 11. As shown particularly in Fig. 2, the refractory material is interlocked with vertical T-shaped columns 12 which are secured to the plates 10 by means of angles 14. These wall structures

from the opposite side walls of a horizontal gas passage 15. The bottom of this gas passage is formed by a metal tank or collecting basin 16 lined with refractory material 18 and provided with a suitable drain pipe 19. The upper wall of the gas passage 15 is formed in part by an upper tank 20 constructed of cast iron or other suitable material and supported by four vertical columns 22 located outside of the gas passage. In front of and to the rear of the tank 20 are two horizontal wall structures 23 constructed of metal lined with refractory material. These structures 23 are located slightly below the bottom of the tank 20, and they serve to complete the upper wall of the gas passage.

Gas is delivered to the passage 15 through an inlet duct 25, and the gas leaves the passage 15 through an outlet duct 26. The inlet duct 25 is arranged to receive the gas as it flows downwardly, and the outlet duct is arranged to discharge the gas in an upward direction. Consequently the gas travels in a U-shaped path, which not only saves floor space but it also tends to separate the heavier particles of foreign matter from the gas by gravity and centrifugal action, and to deposit such particles in the lower tank 16. To facilitate such deposit, the bottom walls of the ducts 25 and 26 are inclined downwardly toward the tank 16, and pipes 27 are provided to spray water on these inclined walls when desired to wash the particles into the tank. The ducts 25 and 26 are provided with suitable doors 28 which allow access to the interior of the scrubber.

Deflecting members in the form of vertical plates 30 are provided in the passage 15, these plates being arranged in five transverse rows. The plates 30 are inclined at approximately 45 degrees to the general direction of flow of the gas, and the plates of adjacent rows are inclined in opposite directions, thus forming a series of zig-zag passages for the gas, as shown particularly in Fig. 2.

Water is supplied to the surfaces of the plates 30, and for this purpose a receptacle 31 is formed at the upper end of each plate. Each receptacle is open at the top, and its bottom wall is provided with several openings 32 through which water may flow downwardly to the opposite sides of the plate therebeneath and spread over the plate in a thin film. The plates are formed with vertical ribs 34 which prevent the water from being swept from the plates by the action of the gas stream. Water is supplied to the upper tank 20 through a pipe 35, and this water is distributed among the receptacles 31 by means of metering devices in the form of vertical tubes 36 (Fig. 3) of the type disclosed in my prior application Serial No. 735,444, filed July 16, 1934 (since issued as U. S. Patent 2,048,403, dated July 21, 1936).

The tubes 36 are open at the top and provided with vertically spaced openings 38 in their sides, the lower ends of the tubes being mounted in plates 39. These plates are surrounded by gaskets 40 and inserted in openings 41 in the bottom wall of the tank and directly above the receptacles 31.

The deflecting plates 30 rest by gravity on the bottom wall of the lower tank 16, and each plate is preferably formed with an enlarged base or block 43 at its lower end. Bricks 44 (Fig. 2) may be placed between adjacent blocks 43 to maintain them in the desired positions. The plates are supported laterally at the top by means of lugs 45 (Fig. 3) which project downwardly from the bottom of the upper tank 20 into the receptacles 31. These lugs are curved on their outer surfaces to facilitate assembly of the various parts. It will be understood that when mounting a plate 30 in the passage 15, the erector will hold the plate at an angle with the vertical and bring the receptacle 31 at the upper end of the plate into engagement with the lugs 45, whereupon the lower end of the plate can be swung into position.

The deflecting plates 30 are subjected to water and sulphurous gases at comparatively high temperatures, and if the water supply should fail the temperature would rise still higher. In order to enable the plates to withstand these conditions they are preferably constructed of a ceramic material, such as baked fireclay. Except for the receptacles 31 and the blocks 43, the plates are made of a uniform cross-section from top to bottom. This makes it possible to form the plates by extruding the clay while in a plastic condition through a suitably shaped die and thereafter baking the plates. Each plate is preferably made in several sections to facilitate manufacture and handling.

In order to hold the various parts of the plates in assembled relationship, each plate is provided at each edge with a longitudinal bead 47 having a circular opening 48 extending longitudinally therethrough and connecting at its ends with circular recesses 49 in the receptacle 31 and block 43. A metal rod 51 is mounted in each opening 48 with its ends extending into the recesses 49. The ends of the rod are screw-threaded to receive nuts 52, and between the bottom of each recess and the corresponding nut there is provided a plain washer 53 and a spring washer 54. The nuts 52 are preferably adjusted to clamp the plate sections together firmly and yet not completely flatten the spring washers 54. These washers will then serve to compensate for any unequal expansion between the refractory material and the metal rod. After adjustment of the nuts 52, the recesses 49 are preferably filled with refractory material 56, which may be applied in plastic form.

The operation of the invention will now be apparent from the above disclosure. Water enters the upper tank 20 from the pipe 35, and flows through the openings 38 into the receptacles 31. The water escapes from the receptacles through the openings 32 and flows downwardly over the surfaces of the plates 30 in thin films. Dust-laden gases enter the passage 15 from the inlet duct 25, and after flowing among the plates 30 they escape through the outlet duct 26. The dust particles carried by the gases are retained by the water films and washed downwardly into the

lower tank 16, whence they escape through the outlet pipe 19. The receptacles 31 fill the space immediately below the upper tank 20 rather completely, as shown in Fig. 3, and the wall structures 23 extend downwardly below the tank. As a result very little of the flowing gas will find its way into contact with the upper tank, and the tank will have a comparatively long life. The ceramic plates 30 will remain free from corrosion, and they are capable of withstanding relatively high temperatures occasioned by possible failure of the water supply. These plates are comparatively simple and inexpensive to manufacture. The metal rods 51 are completely enclosed in the ceramic material and hence thoroughly protected from corrosion.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A deflecting member for gas scrubbers comprising an upright plate having an opening extending throughout substantially the entire length thereof, a receptacle at the upper end of the plate, the receptacle having an opening aligned with the opening in the plate, and a rod extending through the openings to maintain the parts in assembled relationship.

2. A deflecting member for gas scrubbers comprising an upright plate having an opening extending throughout the entire length thereof, a receptacle at the upper end of the plate, a base at the lower end of the plate, the receptacle and base having openings aligned with the opening in the plate, and a rod extending through the openings in the receptacle, plate and base to maintain the parts in assembled relationship.

3. A deflecting member for gas scrubbers comprising an upright plate, a receptacle at the upper end of the plate, a base at the lower end of the plate, said plate, receptacle and base having aligned openings and the receptacle and base having recesses communicating with the openings, a rod extending through the openings, and abutments on the rod located in the recesses.

4. A deflecting member for gas scrubbers comprising an upright plate, a receptacle at the upper end of the plate, a base at the lower end of the plate, said plate, receptacle and base having aligned openings and the receptacle and base having recesses communicating with the openings, a rod extending through the openings, abutments on the rod located in the recesses, and a spring between one of the abutments and the bottom of the corresponding recess.

5. A deflecting member for gas scrubbers comprising an upright plate divided horizontally into sections, a bead extending along each edge of the plate and provided with a longitudinal opening therethrough, and rods extending through the openings to maintain the sections in assembled relationship.

6. A deflecting member for gas scrubbers comprising an upright plate, a bead extending along each edge of the plate and provided with a longitudinal opening therethrough, a receptacle at the upper end of the plate, a base at the lower end of the plate, the receptacle and base having openings therein aligned with said longitudinal openings, and rods extending through the openings to hold the parts in assembled relationship.

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