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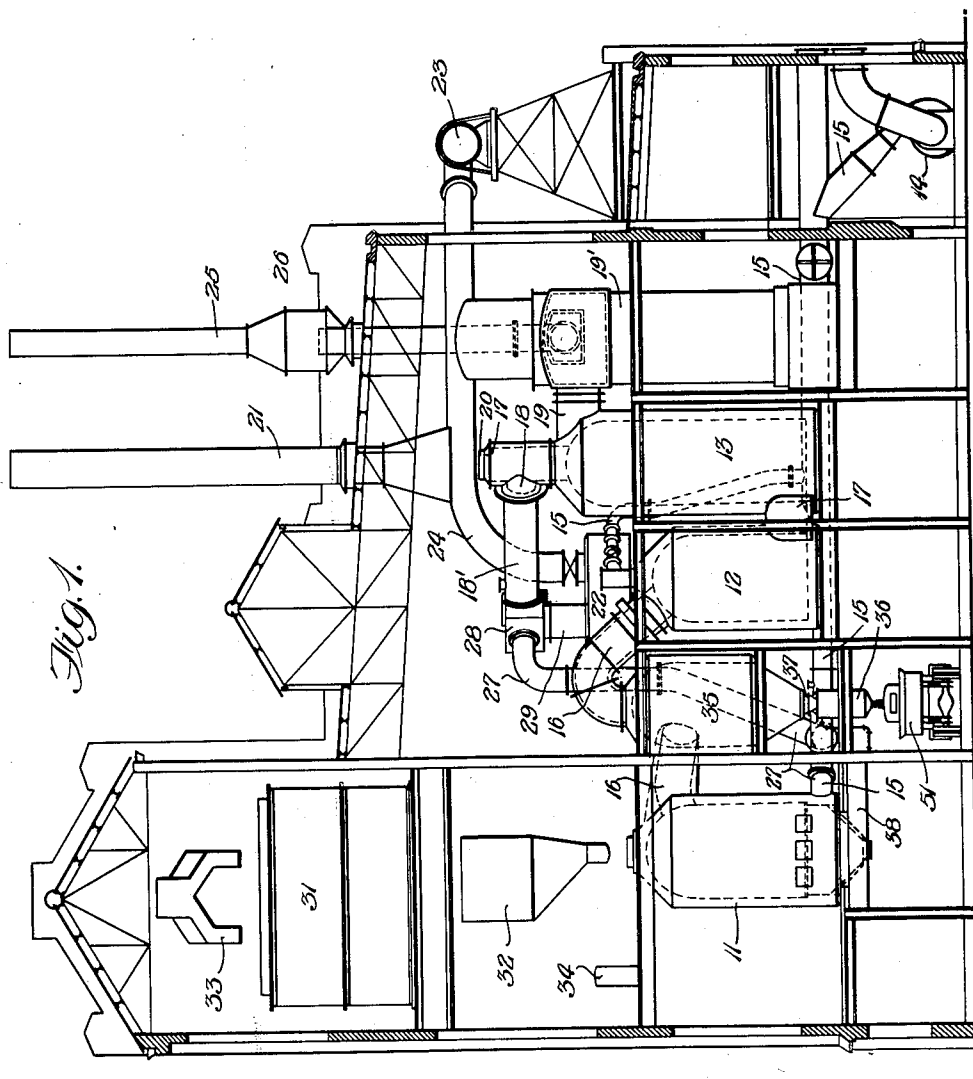
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DUST QUENCHER FOR WATER GAS APPARATUS AND THE LIKE

Filed Feb. 25, 1931

4 Sheets-Sheet 1



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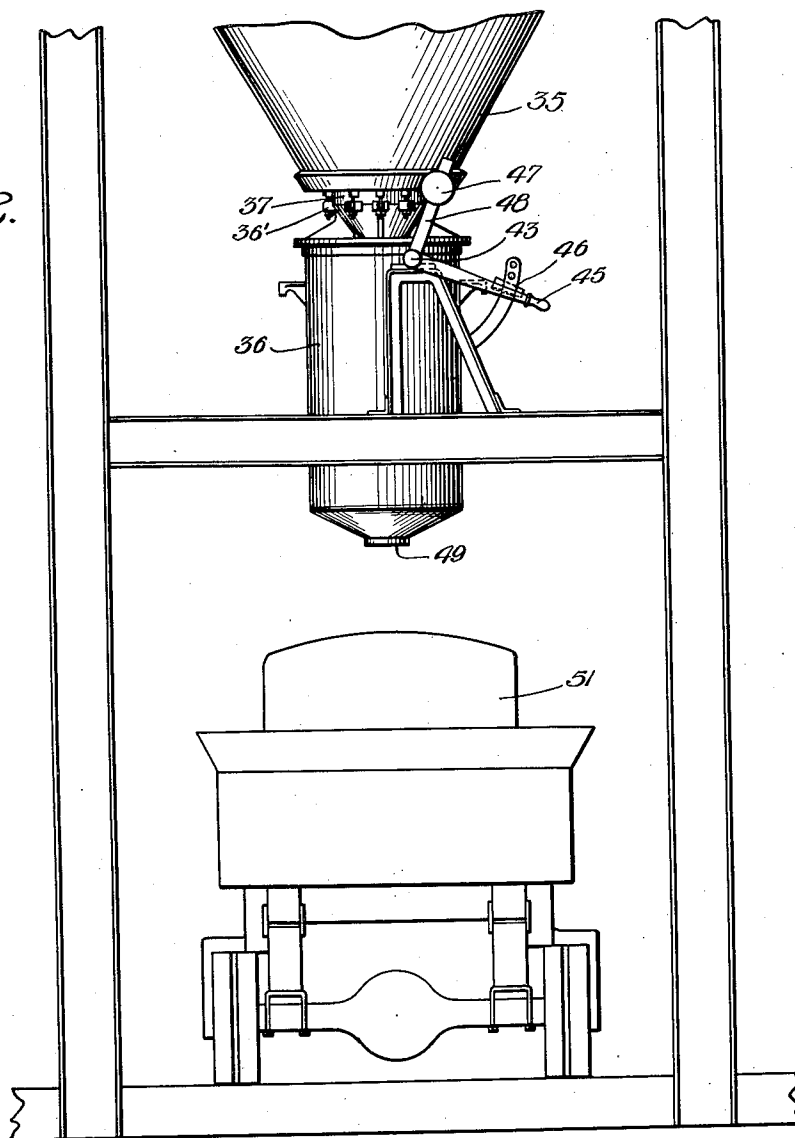
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Fig. 2.



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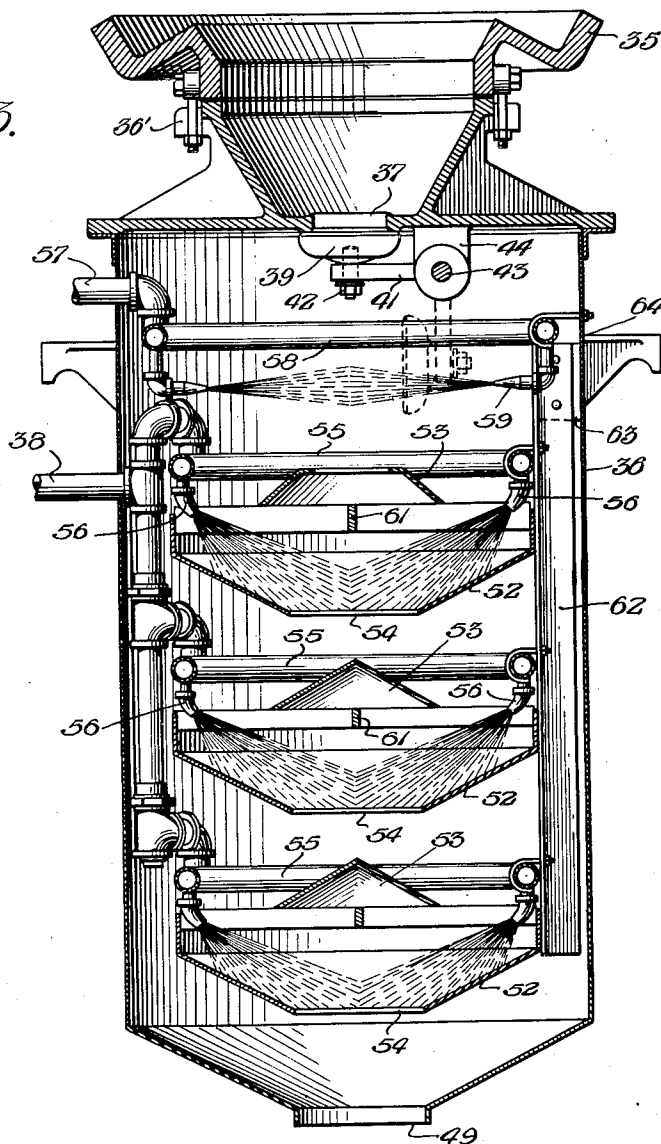
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Fig. 3.



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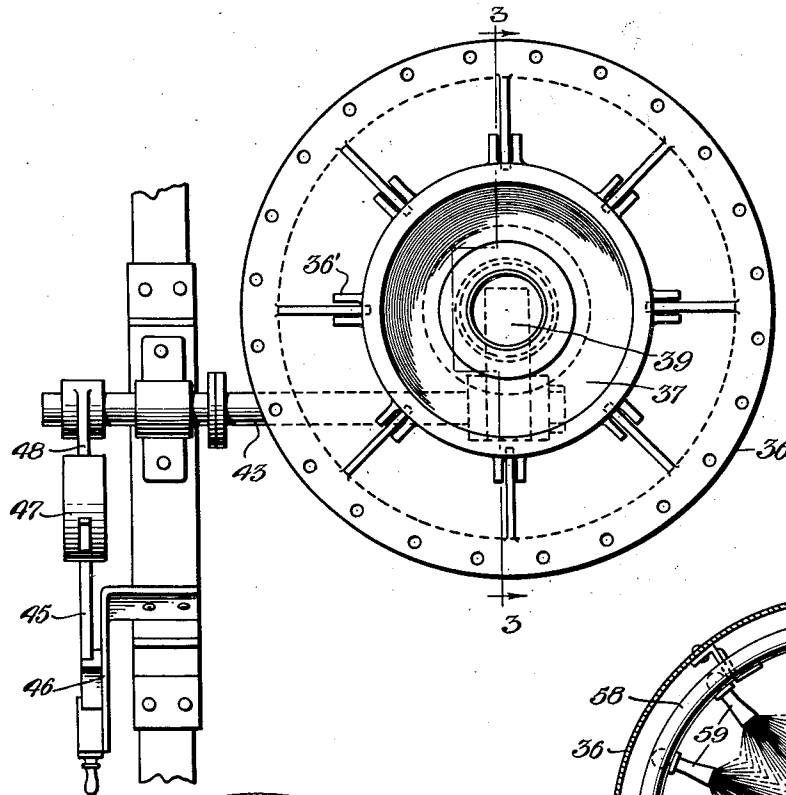


Fig. 6.

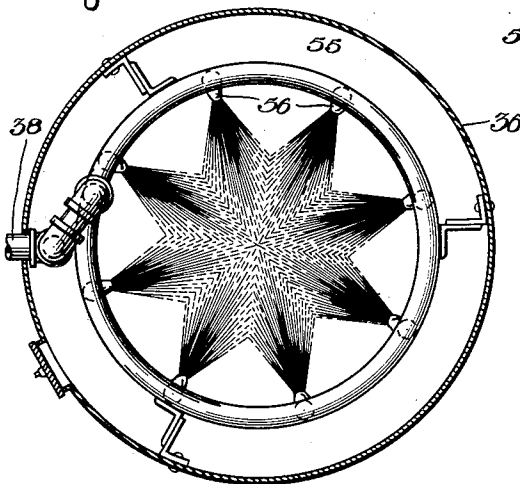


Fig. 4.

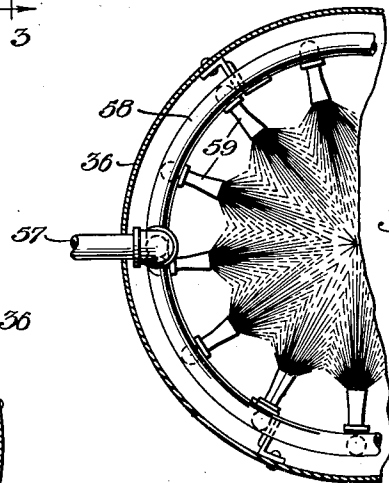


Fig. 5.

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UNITED STATES PATENT OFFICE

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DUST QUENCHER FOR WATER GAS
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2 Claims. (Cl. 48—80)

This invention relates in general to improvements in quenching dust from gas-dust collectors for gas producing apparatus and more particularly to improvements in quenching dust from the usual dust collectors employed in the line of communication between the generator and carburetor, or other heat regenerative chamber, of water gas and carbureted water gas apparatus.

In such apparatus, due to the heat and other causes obtaining in the apparatus because of features inherent in the processes practiced in such apparatus and peculiar to water gas manufacture, the dust when discharged is so very hot and sometimes even incandescent as to require quenching. The provision of a remote quenching system for quenching such dust is unsatisfactory since this necessitates the provision of bricklined cars for conveying the dust while hot to the quenching chamber and the hot dust scatters around the apparatus during discharge from the dust collector into the car and during conveyance to the quenching system. To eliminate this it has been proposed to quench the dust as it falls from the dust collector into the car but the method is accompanied by the same disadvantages, since the dust still scatters during its fall into the cars, the fire-brick lining is still required and the dust when wetted tends to form into spheres of inner incandescent and outer quenched dust which tend to repel each other, and refuse to be further wetted, tending to float on the surface of the accumulating spent quenching liquid.

Objects of the present invention are the provision of a quenching device for quenching dust from such gas-dust collectors that will effectively eliminate scattering of the dust into the atmosphere during discharge from the dust collector and which will discharge the dust as relatively cool quenched dust, thereby eliminating the need for linings of fire-brick on the dust cars and conveyance of dust while hot to remote quenching systems; the provision of a quenching chamber having the above advantages which may be readily attached to existing dust collectors in use without material alteration thereof; the provision of means for mixing or agitating the dust during quenching and thereby overcoming the difficulty in thoroughly quenching the dust due to its inherent tendency to form, when wetted, self-repellent spheres that refuse to be further wetted; the provision of a quenching apparatus of the above noted type adapted for periodic communication with the dust collector for periodically receiving, quenching and discharging the dust therefrom thoroughly quenched, thereby

permitting substantially continuous operation of the dust collector without substantial loss of gas through the quenching apparatus as might obtain with continuous discharging of quenched dust from the quenching chamber; the provision of means for condensing and washing down vapors that may rise within the quenching chamber due to the quenching operation therein and thereby preventing such vapors from passing into the dust collector and corroding the same or wetting dust so as to clog therein; and the invention has for further objects such other advantages in construction and operation as may be found to obtain in the structure hereinafter described or claimed.

In the accompanying drawings forming a part of this specification, and showing, for purposes of exemplification, a preferred form and manner in which the invention may be embodied and practiced, but without limiting the claimed invention to such illustrative instances:

Figure 1 is an elevational view, partly in section, of a water gas apparatus or set embodying the invention;

Fig. 2 is an enlarged elevational view of a portion of Fig. 1 illustrating more clearly the dust quenching chamber in its relationship to the dust collector and dust-car.

Fig. 3 is an enlarged vertical cross-sectional view of the quenching chamber taken on line 3—3 of Fig. 6, and showing in detail the quenching liquid supply piping and nozzles, condensing liquid supply piping and nozzles, and the gas-tight closure between the quenching chamber and the dust collector;

Fig. 4 is a plan view of one of the quenching-liquid supply manifolds and nozzles therefor, illustrating the flow of quenching liquid therefrom into the quenching chamber;

Fig. 5 is a plan view of the condensing-liquid supply piping and nozzles therefor, illustrating the flow of liquid into the quenching chamber for condensing vapors that may rise therein from the quenching operation;

Fig. 6 is a plan view illustrating the gas-tight closure-door for the bottom of the dust collector and the door operating and locking mechanism therefor.

In its present embodiment the invention is incorporated in a carbureted water gas set of usual and well-known construction, and for convenience the following description of the present invention will be confined to this use of the invention. Features of the hereinafter described invention are, however, susceptible of other val-

uable application, such as, for instance, in combination with other types of gas producing apparatus, for instance, in blue water gas apparatus, and consequently the invention is not limited in its application to the specific use and specific embodiments herein described as an illustrative example.

Referring to the drawings, there is illustrated a water gas set of usual and well-known construction in the art. As shown, said set comprises a generator 11, and heat regenerator chambers comprising a carburetor 12, and a superheater 13. Air for air-blasting the generator 11 to heat it up and for secondary combustion of the air blast gas in the carburetor 12 and superheater 13 is supplied by a blower 14 and piping 15 having connections with the generator, carburetor and superheater. As shown, the carburetor 12 is connected at its top with the top or the generator 11 by gas line 16, and is connected at its bottom with the bottom of the superheater 13 by gas flow connection 17. The superheater 13 is, as shown, provided with three gas outlets, at its top, a purge gas outlet 17, a carbureted water gas outlet 18 and an air blast gas outlet 19. The purge gas outlet 17 is provided with a purge valve 20 for controlling the outlet of purge gas to the superheater purge stack 21. This purge valve is normally closed except during purging of the set in the water gas cycle. The carbureted water gas outlet connection 18 leads to the usual wash box 22 from whence the water gas of the set is conveyed to use or storage or, as shown, to a collecting main 23 by the gas conduit 24 for further treatment.

In the present embodiment of the invention the air blast gases, instead of being discharged from the superheater through a superheater stack 21, are led through the third outlet 19 to a waste heat boiler 19 for use therein from whence the residual gas is discharged through the waste heat boiler stack 25 controlled by stack valve 26, and the generator is adapted for practicing the processes well known in the art as the by-pass or backrun. For this purpose there is provided the usual by-pass or backrun conduit-connection 27 for leading by-pass or backrun water gas directly from the bottom of the generator to the wash box 22. The conduit-connections 18 and 27 advantageously lead to a common valve housing 28 controlled by a three-way backrun valve of any usual and well-known construction disposed advantageously outside the wash box and connected thereto by the single connection-conduit 29. The generator is charged with fuel from a coke bin 31 by a weighing hopper 32, the supply of fuel to the bin 31 being maintained by tripper 33. It will of course be understood that the set is provided with the usual provisions for supplying oil to the carburetor and steam to the bottom of the generator for uprun water gas and steam to the superheater and/or top of the generator for the production of usual and well-known backrun or by-pass water gas as well as valve control mechanism for automatically controlling the operation of the usual essential valves in sequence by an automatic control, illustrated diagrammatically at 34, of any usual and well-known construction in the art, such as, for instance, the Critchlow type. Detail illustrations of such provisions are omitted for convenience, since they form no especial part of the present invention and are well known in the art.

Arranged in the line of communication 16 be-

tween the carburetor 12 and generator 11 is a gas-dust collector or pocket 35 for collecting dust from the air blast gases and uprun water gas passing from the generator to the carburetor or such gas as backrun gas that may pass from the carburetor into the top of the generator. This dust has been found, when periodically discharged from the dust collector 35 to be very hot and even incandescent and consequently requires quenching. To this end there is provided a quenching chamber 36 connected to the bottom outlet 37 of the dust collector, and provided with quenching-liquid supply means 38 for supplying liquid, such as water, into the quenching chamber so as to quench the dust before it passes into the atmosphere. Such means has proved to be particularly effective and advantageous since it not only effects quenching but prevents scattering of fine dust when discharged through the atmosphere due to its being previously wetted. As the dust needs to be discharged from the dust collector only periodically, for instance, once a day, there is provided a gas-tight closure for closing the outlet 37 comprising a door 39 and operating mechanism therefor consisting of an arm 41 connected at 42 to the door 39 and to a shaft 43 pivotally mounted in brackets 44 for pivotal movement of the door into and out of gas-tight relation with the gas-dust outlet 37. Advantageously the shaft is provided with an operating lever 45 movable upwardly for opening the door 39 and downwardly for closing the same. A locking mechanism 46 is provided for locking the lever 45 against movement when the door 39 is in closed position and a counterweight 47 and lever 48 therefor connected, as shown, to the lever 45 so as to remain above and off the center of the shaft 43 when the door is closed to insure against accidental opening of the door under sudden or increased pressure on the door 39 in the dust collector 35. Advantageously, the quenching chamber is made as a separate unit from the dust collector but so as to be connectible by connections 38' to dust collectors already in actual service, thereby enabling the quenching chamber to be assembled as a unit and readily attached to dust collectors already in operation in gas apparatus without material modification and alteration therefor preventing prolonged shut-downs of the gas making apparatus for purpose of providing the dust-quenching system thereon. As has been mentioned above, it has been found that when wetted the dust tends to form in independent spheres which tend to repel each other and are water repellent, refusing to further mix or break up under showers of water and to be further wetted. In falling by gravity from the dust collector the dust therefore is not thoroughly quenched due to the shortness of the path of travel available for an attached quenching chamber by reason of the limitations of space inherent in dust collectors occasioned by their peculiar locations required of gas apparatus. It has been found, however, that this difficulty is amply overcome by the simple expedient of providing mechanical means for agitating or violently mixing the dust spheres with each other and the quenching medium while passing through the quenching chamber, such means being ample to thoroughly break up the spheres of dust so that a relatively small quenching chamber, satisfying the requirements as to limitations of space, is ample to assure discharge of thoroughly quenched dust which does not scatter when passing from the bottom outlet 49

of the quenching chamber through the atmosphere to the usual dust-car 51. In providing such mixing or agitating means it has been found that the provision of a plurality of superposed, oppositely inclined, downwardly directed, dust baffles 52, 53, is especially suitable for effecting the breaking up of the wetted spheres of dust, since in falling by gravity from one baffle 52 to another baffle 53 the dust is thereby broken up and thoroughly quenched during its gravity fall. Preferably, the baffles consist, as shown, of a plurality of annular, downwardly and inwardly inclined, dust-baffle pans 52 arranged one above the other and provided with concentric dust discharge openings 54 arranged concentrically with each other and with the dust outlet 37 and supplementary inverted baffle cones 53 disposed intermediately of the dust baffle-pans and over the concentric openings 54. The quenching-liquid supply means 38 is provided with a plurality of manifolds 55, each having a series of nozzles 56, arranged so that there is one manifold 55 and one series of nozzles 56 for each pan 52. The nozzles 56 are arranged so as to discharge downwardly directly into the pans 52 and have their outlet ports shaped to eject the liquid in coarse streams so as to thereby wash down from the surfaces of the pans 52 any dust that may tend to stick thereon as well as to quench the dust. During the quenching of the dust water vapor or steam is formed which tends to rise and pass upwardly through the outlet port 37 into the dust collector 35. This vapor tends to wet the interior metallic surfaces of the dust collector, causing corrosion thereof and also causing dust to adhere thereto which may cause stoppage of dust in the outlet port 37 and incomplete seating of the door 39.

To overcome this, there is provided the supplementary liquid supply means 57 for delivering condensing liquid between the uppermost dust-baffles 52, 53 and quenching liquid supply means 38 and the dust collector 35. This supply means preferably consists of a manifold 58 having a series of nozzles 59 arranged annularly within the quenching chamber and having ports shaped to discharge a condensing liquid in the form of a fine spray into the path of water vapor or steam that may pass to the dust collector outlet 37 during passage of dust through said outlet and quenching of the dust. The provision of such means has been found in practicing the present invention to be effective in condensing and washing down substantially all quenching vapor or steam that may rise to the outlet 37 and prevent passage of such vapor and steam into the dust collector while the door 39 is in its open position, thereby permitting the quenching to take place simultaneously with discharge of dust from the dust collector and during its gravity fall through the quenching chamber, rendering unnecessary collecting and holding of the dust in the quenching chamber for subsequent quenching of the dust after the door 39 is closed.

As shown, the baffle cones 53 are supported on bars 61 carried by the baffle pans 52 and all of the baffle pans 52 are secured to outer vertical supports 62 which are bolted to and carried by clips

63 secured to the vertical wall 64 of the quenching chamber so as to suspend the baffles in annularly spaced relation to the wall 64. This construction is particularly advantageous in that it permits of great facility in securing the baffles 52 and 53 together as a unit outside the quenching chamber and removal from and insertion and securing of the unit in place, within the quenching chamber with greater ease and economy.

From the foregoing it will be apparent that substantially all scattering of fine hot or incandescent dust is entirely eliminated during discharge thereof from the water gas set dust collector and the need for fire-brick linings for the dust car entirely eliminated. It will also be apparent that the invention obviously may have utility with dust collectors in which the connections are such that the dust is not hot or incandescent for in effecting wetting of the dust before it discharges into the atmosphere the wetting of the dust prevents its scattering.

The invention as hereinabove set forth is embodied in particular forms of construction but may be variously embodied within the scope of the claims hereinafter made.

I claim:

1. The combination with a carbureted water gas apparatus comprising a generator, a carburetor communicably connected with the generator for gas flow therethrough, and a dust collector in the line of communication between the generator and carburetor, of a dust quenching chamber connected with the dust collector for communication therewith and adapted for receiving dust therefrom and for quenching and discharging the dust as quenched dust while closed off from the dust collector and during simultaneous collection of dust thereby, a plurality of superposed, oppositely inclined, downwardly directed, stationary dust baffles arranged in said quenching chamber for baffling dust during passage thereof through the quenching chamber, and means for supplying dust-quenching liquid to said quenching chamber for mixture with dust on said baffles.

2. The combination with a dust collector for collecting dust from gas and having a gas inlet and outlet for gas from gas producing apparatus of a dust quenching chamber connected thereto for communication therewith and adapted for receiving dust therefrom and for quenching and discharging the dust as quenched dust while closed off from the dust collector and during simultaneous collection of dust thereby, a plurality of superposed, oppositely inclined, downwardly directed, stationary dust baffles arranged in said quenching chamber for baffling dust during passage thereof through the quenching chamber, means for supplying dust-quenching liquid to said quenching chamber for mixture with dust on said baffles, and supplementary liquid supply-means for supplying condensing liquid into said quenching chamber between the dust collector and the uppermost of the baffles for condensing and washing down in the quenching chamber vapors rising therein towards the dust collector.

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