

Nov. 29, 1949

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2,489,893

APPARATUS FOR PURIFYING AND FEEDING SAMPLE GAS

Original Filed Jan. 16, 1940

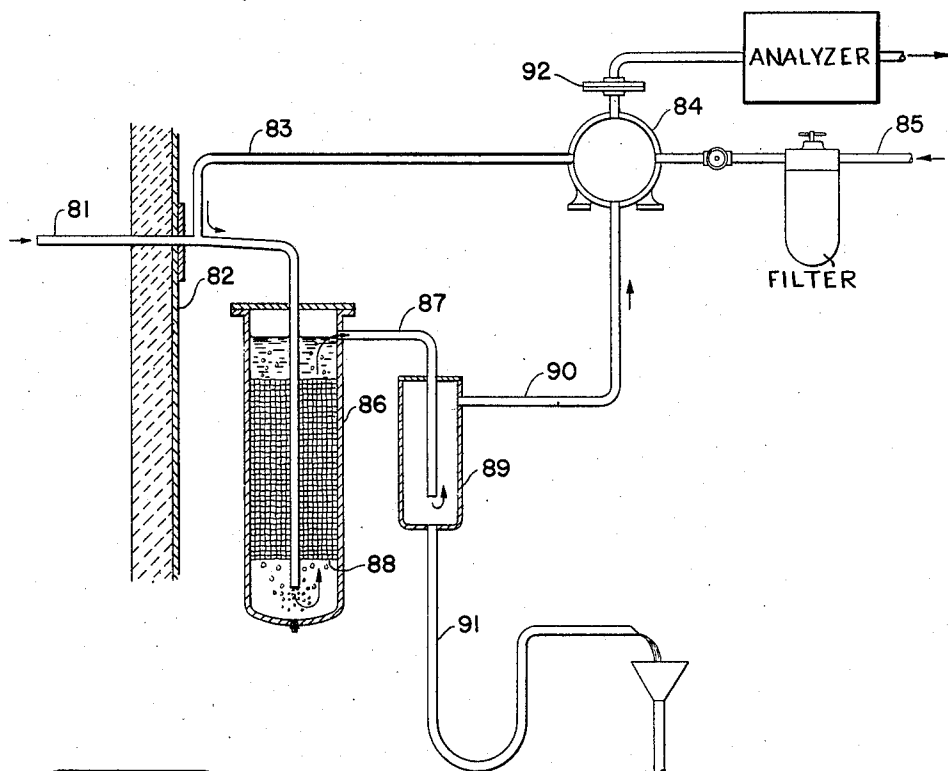


FIG. 2

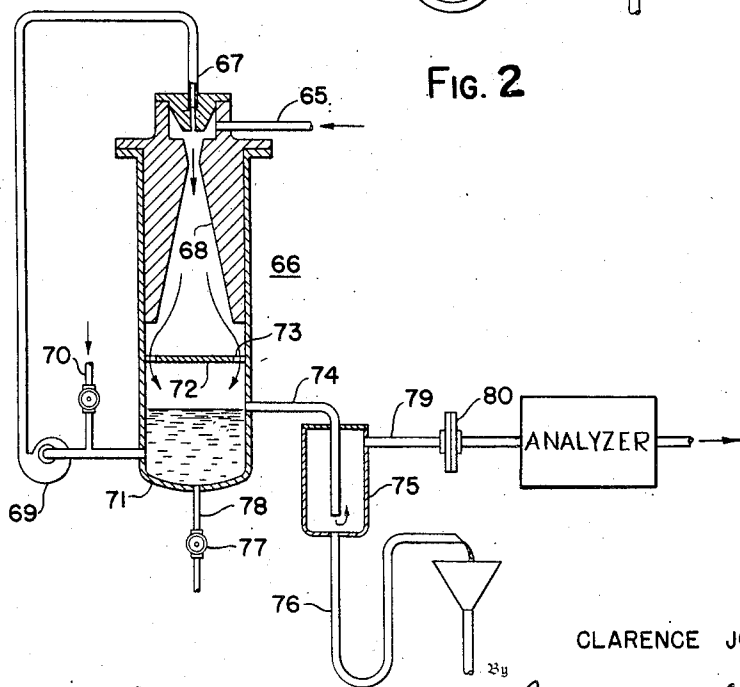


FIG. 1

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2,489,893

APPARATUS FOR PURIFYING AND FEEDING
SAMPLE GASClarence Johnson, South Euclid, Ohio, assignor
to Bailey Meter Company, a corporation of
DelawareOriginal application January 16, 1940, Serial No.
314,189; Divided and this application August
4, 1944, Serial No. 548,106

4 Claims. (Cl. 183-26)

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This invention relates to apparatus for purifying and feeding sample gas to a gas analyzer.

The particular object of the present invention is to continuously provide the gas analyzer per se with a substantially clean gas sample for analysis therein.

In the drawings:

Fig. 1 represents an aspirating apparatus for use with a gas analyzer for supplying a continuous gas sample thereto;

Fig. 2 represents a modified form of sampling apparatus for continuously supplying the gas analyzer with a gas sample, particularly where the gas sample may contain gaseous and solid contaminants.

In the use of my analyzer as disclosed and claimed in my Patent No. 2,358,285 it is of primary importance that gases to be analyzed in my apparatus be free from substances that may be injurious to the vital working parts, as to detectors and catalysts, and that such gases be fed in a constant, unvarying stream. Cases which tend to occlude or poison catalysts and detectors greatly shorten their utility, necessitating frequent replacements. I have therefore devised a means for my apparatus of securing a proper sample of gas. I use the aspirating method of Fig. 1 for securing a continuous and proper gas sample to my analyzer where the exhaust gases are nearly entirely devoid of poisonous gases as sulphurous compounds and suspended solid matter. Such gases issue usually from gas and oil fired furnaces. Then, tapping such furnace at a representative point (not shown) the sample is sucked through pipe 65 of aspirator 66 by means of the aspirating effect of a stream of water issuing from a nozzle 67 into a diverging cone 68. A pump 69 having a supply source 70 and the reservoir 71 furnishes the water at a desired pressure. This mixture of gas and water is then forced through numerous circumferential orifices 73 of a baffle plate 72 in the flow path of the mixture and substantially at the foot of the aspirator cone 68. The level of reservoir 71 is determined by an overflow pipe 74 which leads into a gas tight cylinder 75. The overflow will also carry out any floating material rising to the surface of the reservoir whence it flows to waste through 75 and U-shaped pipe 76. Reservoir 71 can be occasionally cleaned by means of valve 77 in pipe 73. The gas brought in by the water is forced through pipe 74 into cylinder 75 where its flow is reversed, causing it to further yield any entrained liquid it may have, then from cylinder 75 it flows out through pipe 79 through a final felt filter 80 to my analyzer. A

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particular advantage of this recirculating aspirating type of gas supplying means is the small amount of additional fresh water that is needed for its operation. The main source is the accumulation of reservoir 71, and this supply is used over repeatedly.

In Fig. 2 I show a supplying means adapted for use where gases carry sulphurous mixtures and a good deal of ash. The gas sampling pipe 81 extends from out a furnace wall 82 tapping a representative location for flue gases. A pipe 83 meets 81 outside the furnace wall in a T connection, and water flowing through pipe 83 under a certain pressure given it by a liquid operating vacuum pump 84 commercially known as a "Hytor" pump, and obtaining its water supply from an indicated source 85, carries the flue gas into a washing and scrubbing cylinder 86. Cylinder 86 is filled with water at all times, the depth determined by an overflow pipe 87. Substantially filling the cylinder is a finely meshed screen 88 of a metallic material for taking out any corrosive gases and solid matter. The pipe 81 descends into the cylinder 86 below the screen and to a short distance from its base, causing the gas to reverse its flow and to bubble upwardly to the upper portion thereof where it is collected and forced out. The gas is then sucked through pipe 87 into the overflow chamber 89 where it is again reversed and taken in through pipe 90, the pump 84 through a felt filter 92 and into the analyzing apparatus. The overflow, containing residue, is continually carried off by waste pipe 91.

Thus while I have disclosed an apparatus capable of performing a multiplicity of functions, I further realize that it is susceptible of many modifications, and I therefore wish not to be limited by my disclosure but by the attached claims in view of prior art.

This application constitutes a division of my co-pending application Serial No. 314,189 filed January 16, 1940, now Patent No. 2,358,285, granted September 12, 1944.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. An apparatus for supplying a gas sample to a gas analyzer comprising, in combination, a conduit adapted to communicate with a source of gas to be analyzed, means communicating with said conduit and discharging a continuous diverging stream of liquid relative thereto from a source for producing an aspirating effect which draws a desired quantity of gas through said conduit into the liquid stream, a single flaring chamber into which the gas and liquid are discharged from

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said last mentioned means, baffling means in said chamber for creating a quiescent zone near the bottom thereof wherein said gas and liquid separate, a portion of said chamber below said baffling means forming a reservoir for the separated gas and liquid, a single overflow outlet for both the gas and liquid in said reservoir comprising, a pipe having a horizontal arm extending from said chamber portion and a vertical leg, a drain connection for the liquid passing through said vertical leg, means for collecting and supplying gas from the overflow outlet to the analyzer, and passage means connecting said reservoir with said first mentioned means for supplementing the liquid source.

2. An apparatus for supplying a gas sample to a gas analyzer comprising, in combination, a single vertically elongated chamber partially filled with liquid, a conduit communicating with a source of gas to be analyzed and entering said chamber near the top, means entering the chamber adjacent said conduit and discharging a stream of liquid relative thereto, a downwardly diverging aspirating cone in the upper portion of said chamber arranged to so cooperate with the entering liquid and conduit that the liquid flow causes a continuous stream of gas to be drawn from the source and delivered through the cone, means below the cone and above the liquid level for delaying the liquid fall and separating the gas therefrom, means above the liquid level for conducting the separated gas to the analyzer, and means for conducting the separated liquid from the bottom of the chamber to said first mentioned means.

3. The apparatus as defined in claim 2 in which the gas conduction means includes a combined gas and liquid run-off pipe extending for a portion of its length horizontally from said chamber at the level of the top of the liquid therein and

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means to supply excess liquid to said system to make up for that discharged from said pipe.

4. The apparatus as defined in claim 3 in which a non-flooded chamber is provided intermediate the first chamber and the analyzer, said run-off pipe having a portion entering said second chamber vertically and terminating near the bottom thereof, a liquid discharge pipe for said second chamber, a trap in said discharge pipe to prevent the egress of gas and a gas discharge pipe extending from near the top of said second chamber.

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