

D. J. SMITH.
 COOLING, CLEANSING, AND FILTERING DEVICE FOR GAS.
 APPLICATION FILED DEC. 2, 1918.

1,402,676.

Patented Jan. 3, 1922.

2 SHEETS—SHEET 1.

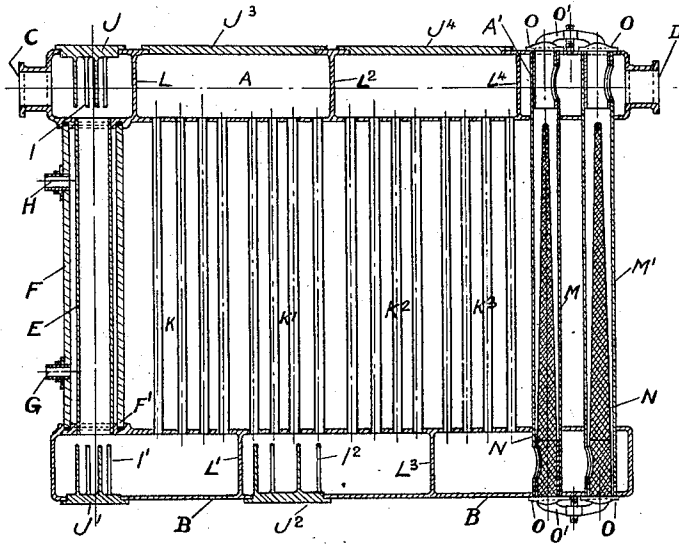


Fig 1

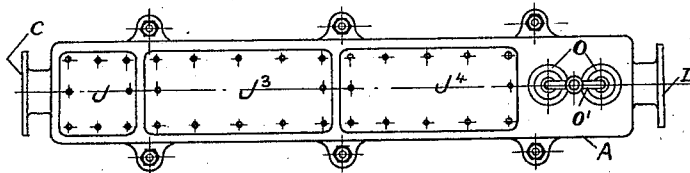


Fig 2

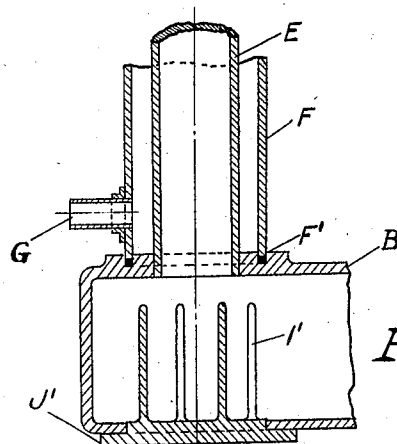


Fig 6

Inventor
 David Joseph Smith
 By *Wm. Co.*
 Attorneys

D. J. SMITH.
COOLING, CLEANSING, AND FILTERING DEVICE FOR GAS.
APPLICATION FILED DEC. 2, 1918.

1,402,676.

Patented Jan. 3, 1922.

2 SHEETS—SHEET 2.

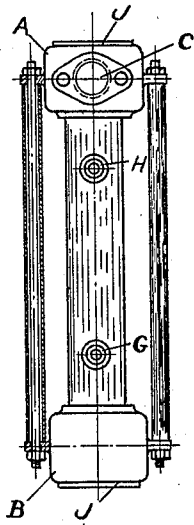


Fig 3

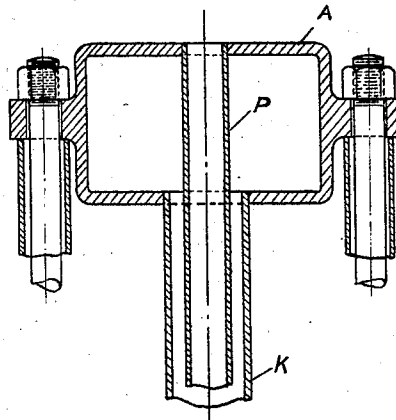


Fig 4

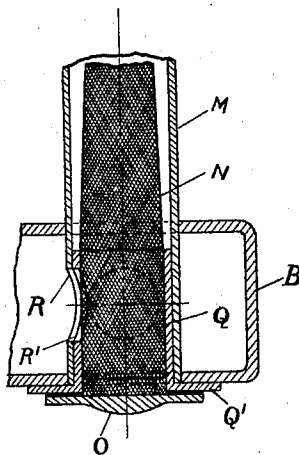


Fig 5

Inventor
David Joseph Smith
By *Wm. Co.*
Attorneys

UNITED STATES PATENT OFFICE.

DAVID JOSEPH SMITH, OF LONDON, ENGLAND, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO AUTOMOTIVE GAS PRODUCER CORPORATION, A CORPORATION OF DELAWARE.

COOLING, CLEANSING, AND FILTERING DEVICE FOR GAS.

1,402,676.

Specification of Letters Patent.

Patented Jan. 3, 1922.

Application filed December 2, 1918. Serial No. 265,044.

To all whom it may concern:

Be it known that I, DAVID JOSEPH SMITH, major in the Army Service Corps, a subject of the King of Great Britain, and a resident of 40 Woodberry Grove, Finsbury Park, London, N. 4., England, have invented new and useful Improvements in or Connected with Cooling, Cleansing, and Filtering Devices for Gas, of which the following is the specification.

This invention relates to improvements in apparatus which is generally known as a gas scrubber as used in connection with suction gas plants for supplying internal combustion engines. The apparatus according to the present invention is also applicable to other types of gas producing plant, or for other gas from which it is desired to remove any matter held in suspension and also reduce the temperature of the gas to the desired degree. The apparatus according to this invention comprises three main parts or divisions, which I term a feed heater or preliminary cooler, the cooler proper, and the filter respectively. In its simplest form the device consists of two boxes or headers, preferably of cast metal and fitted with removable lids, bolted or otherwise secured in an airtight manner. The boxes are connected by tubes or sets of tubes arranged vertically between the headers. The gas from the producer or other source of gas supply enters a chamber formed at one end of a header, and passes through a tube or tubes, preferably of copper to the other header. Around this tube or tubes a jacket is fitted which is watertight and does not communicate with either the top or bottom header. Through the jacket, water is caused to pass either by a pump or other suitable means, in order that it may in cooling the gases in the tube become heated before passing to the steam boiler or vapour generator of the producer, or be otherwise employed on the producer, or run to waste.

When the gas has arrived in the other header through the feed heating or preliminary cooling tubes, it passes through one or more nests or sets of tubes, which may or may not be fitted with other cooling means. The gas may be further cooled either by convection or by a current of air supplied by a fan driven by any suitable means, such air to be directed upon the tubes if desired by suitable sheet metal or other material plates

or baffles arranged around the tubes. Air tubes may be fitted inside and concentric with the cooling tubes, and passing through the headers so that the air can circulate through the cooling tubes as well as outside them. The cooled gas then enters one or more tubes of larger diameter connecting the two headers, fitted with long conical gauze strainers or funnels, removable as hereafter described. The gas passing up through these gauze strainers has all dust or other material in suspension removed, and then passes to the engine or to any other purpose for which it may be required. In place of gauze or metal filters or strainers, coke or similar material may be used, or other material suitable for straining or filtering the gases. In the headers a number of vertical plates are fitted, against which the gas impinges as afterward described. The tubes constituting the parts of elements of the device may be expanded, brazed, screwed or held into the boxes by any suitable method, or shoulders may be formed on each end of the tubes.

In the accompanying drawings I have shown the preferred embodiment of the invention, but it will be understood that considerable modification may be made in the constructional details without departing from the scope of the invention.

Fig. 1 is a part sectional elevation of the apparatus.

Fig. 2 is a plan of same.

Fig. 3 is an end view of same.

Fig. 4 is a detail view showing in section a modified construction.

Fig. 5 is a detail view to a larger scale showing the filtering tube.

Fig. 6 is a detail view to a larger scale of a portion of Fig. 1.

Referring to Figs. 1, 2, 3, and 4, A is the top header and B the bottom header. The pipe supplying the gas from the gas producer or the like to be cooled and cleaned is fitted to the inlet C. The internal combustion engine or heating apparatus to which the gas is to be supplied is connected to the outlet flanged end D. The gases on entering the apparatus, see Figs. 1 and 6, strike against the downwardly projecting plates or ribs I in order to cause the separation of and deposit of any solid particles or sediment or tarry matter, the partition L forming a closure in the header A. The pro-

jecting plates or ribs I are integrally formed with the detachable closing plate J which is adapted to be secured over an aperture for same in the header A. The gases then pass
 5 down the tube E, which tube is rigidly secured in both the header A and the header B above and below respectively, and is provided with a jacket tube F concentrically arranged therewith. The jacket tube F is fitted
 10 in recessed grooves in both headers as shown, a rubber ring F¹ being fitted at each end of the jacket tube in each header in order to allow of expansion of the tube F relatively to the inner tube E and at the
 15 same time prevent leakage of water from the jacket. The jacket is provided in order to heat the feed water for the boiler of the gas producer, the water being supplied to the feed heating jacket by a pump to the
 20 inlet G and leaves same on its return to the boiler at the outlet H.

The producer gases on leaving the tube E are caused to impinge on a similar set of upwardly projecting plates or ribs I¹, shown
 25 to a larger scale in Fig. 6, which are secured to or integrally formed with the plate J¹ fitting over a similar aperture in the bottom header B. From the header B which is closed by the partition L¹ the gases then
 30 pass through a nest or group of tubes K which are secured in the headers A and B. From the header A the gases are then caused to pass down the second nest or group of tubes K¹ where they again impinge upon
 35 the upwardly projecting plates or ribs I² which plates are secured to the cover J² fitting the aperture, as shown, in the header B. The header B is closed by the partition L³ and the gases are therefore caused to
 40 pass upwardly again by the nest or group of tubes K² to the header A and there being a further partition or closure at L⁴, the gases pass downwardly through the nest of tubes K³ again to the header B, thence the
 45 gases may pass through either one or both of the filter tubes M, M¹, to the final compartment A¹ of the header A. The filter tubes M are extended through each of the headers A and B to the upper wall of the
 50 header A and to the lower wall of the header B. Each filter tube has fitted therein a tapered or conical tube N formed of wire gauze closed at the upper end and secured at the lower end in the wall of the header B
 55 by means of the cover plates O, see detail view Fig. 5, which cover plates O are held in position by the two-armed nut O¹, see Fig. 1. The wire gauze tube is formed with a lateral flange on its lower end which is fitted
 60 between the cover plate O and the flange Q¹ of the tube Q which is adapted to be turned by hand as desired within the filter tube M. The short length of tube Q is a gas-tight fit within the tube M so that the
 65 port R¹ formed in the tube Q may be caused

to register with the port R formed in the tube M, the tube Q being turned by means of the projecting flange Q¹ formed integrally therewith, see Fig. 5. When the ports R and R¹ in the tubes register, the gases
 70 pass through into the gauze tube N and through the tapered area of this tube above the valve into the tube M, and thence outwardly to the engine by the outlet pipe D. Provision is thus made by which either of
 75 the filter tubes N may be removed for cleaning purposes without stopping the working of the apparatus, for on turning by hand the flange Q¹, the port R¹ can be turned to a
 80 right angle to the dotted position shown in Fig. 5, thus closing the tube M, and the filter tube N can then be withdrawn to be cleaned, the apparatus continuing to work
 85 through the second suction filter tube M¹. Similar valves Q with ports such as R, R¹, are provided in the tubes M, M¹, at their upper ends for the same purpose.

A suitable fan (not shown) may be used to force or draw the gases through the banks of tubes K, K¹, K², K³, and through both of
 90 or one of the filter tubes M, in order to assist in overcoming the frictional resistance in passing the producer gases through these tubes. Or alternatively, air may be deflected or driven upon the nest of tubes K,
 95 K¹, K², K³, by means of suitable casings or baffle plates, not shown, in order to cool same.

Referring to Fig. 4, as a further means of cooling some or all of the nests of tubes K,
 100 each tube K or some of the nests may have fitted concentrically through same a tube P. This tube extends not only through the tube K but also through the headers A and B and is secured in the upper and lower walls of
 105 same respectively, so that each tube P being open to the atmosphere air may pass freely through the tubes P and cool the gases flowing through the tube K in the annular space thus provided between the tubes P and
 110 the tubes K.

Cover or closing plates J³, J⁴, are also provided on the header A in order to render the nests or groups of tubes accessible for
 115 cleaning purposes.

What I do claim as my invention and desire to secure by Letters Patent is:—

1. A cooling, cleansing and filtering device for gas, comprising upper and lower headers, groups of radiator tubes connecting said
 120 headers, partitions in said headers for causing gases to pass successively through one group of said tubes and thence in the opposite direction through the next adjacent
 125 group of tubes into the opposite header, baffle plates in said headers beyond said groups of radiator tubes, and tubes containing filtering material and communicating with the headers.

2. A cooling, cleansing and filtering de- 130

vice for gas, comprising upper and lower headers, radiator tubes connecting the headers filtering tubes connecting said headers at one end, said filtering tubes being each provided with means for establishing communication with the headers or cutting off communication therewith, and removable filtering material supported in the respective filtering tubes.

3. In a device of the character described, upper and lower headers, tubes connecting the headers, said tubes having ports opening into the lower headers, filtering material in the said tubes, and short tubes mounted to turn in the first named tubes and each provided with a port adapted to register with the port of said tubes.

4. In a device of the character described, upper and lower headers, the lower header having openings in its outer wall, tubes arranged over openings in the lower headers and connecting the headers and having communication therewith, means for controlling the communication of the tubes with the lower header, filtering tubes in the first named tubes, cover plates for the openings

of the lower header, and means for securing the cover plates in position.

5. In a device of the character described, upper and lower headers having openings in their outer walls, and closures for closing said openings, provided with a plurality of plates projecting from their inner faces, and a plurality of tubes connecting the headers.

6. A cooling, cleansing and filtering device for gas, comprising an upper and a lower header, a series of radiator tubes connecting said headers, partitions in said headers causing the gas to pass successively through said radiator tubes, and tubes connecting said headers at each end of said radiator tubes forming respectively a preliminary cooling chamber and filtering chambers, removable filtering material in the filtering tubes, and means for supporting said material through which the gas finally passes, the gas being subjected to a preliminary cooling in the cooling chamber, then passed through the tubes and then through the filtering material, substantially as described.

D. J. SMITH, MAJOR.