

UNITED STATES PATENT OFFICE.

WALTER R. ADDICKS, OF BROOKLINE, MASSACHUSETTS.

APPARATUS FOR MANUFACTURING CARBURETED WATER-GAS.

SPECIFICATION forming part of Letters Patent No. 758,882, dated May 3, 1904.

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To all whom it may concern:

Be it known that I, WALTER R. ADDICKS, a citizen of the United States, residing in Brookline, in the county of Norfolk and State of Massachusetts, have invented an Improvement in Apparatus for Manufacturing Carbureted Water-Gas, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to an apparatus for manufacturing carbureted water-gas, and has for its object to provide apparatus for the purpose specified in which a superior gas may be made at a minimum expense.

In the manufacture of carbureted water-gas the apparatus commonly employed comprises a generator, a carbureter, and a fixing-chamber, and the oils or hydrocarbons employed to enrich the water-gas are heated and admitted into the carbureter.

This present invention relates more particularly to apparatus for heating the oil or hydrocarbon, whereby the formation of lampblack or deposits of heavy hydrocarbons in the carbureter are avoided or at least largely diminished, so that the fixed gases are free or substantially free from lampblack, tar, or carbon particles, which enables the said gases to be utilized for heating the apparatus through which the oil is supplied to the carbureter without the necessity of frequent cleansing of said apparatus or heater. For this purpose I employ an oil-heater comprising, preferably, a coil or series of connected pipes arranged in a substantially horizontal path and preferably connected together, so that the oil admitted into one end of said coil may flow by gravity toward the outlet end of said coil, thereby avoiding or reducing to a minimum the danger of oil being left in the heater and forming a dangerously high pressure, which causes the heater to leak at the joints, and, further, forming obstructions or traps when the apparatus is shut down for a longer or shorter time and also when the apparatus is running, which obstructions or traps, if allowed to occur, necessitate the use of a considerable or abnormally high pressure to force the oil through the heater. The sub-

stantially horizontal heater is located in a substantially horizontal pipe which forms part of the gas-outlet pipe for the fixing-chamber and which leads to a hydraulic main located at an elevation and preferably on a plane substantially level with the tops of the generator and carbureter, which enables the operator to tend to the apparatus from one plane and, further, enables the hydraulic main to be readily drained of its tarry matters.

These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 represents in elevation and section a carbureted water-gas apparatus embodying this invention; Fig. 2, a plan view of the apparatus shown in Fig. 1; Fig. 3, a sectional detail, on an enlarged scale, to be referred to, the section being taken on the line 3 3, Fig. 1; and Fig. 4, a section of a modification to be referred to.

This invention is shown as embodied in an apparatus comprising a generator *a*, a carbureter *b*, and a fixing-chamber *c* of any usual construction.

In accordance with this invention the carbureter *b* has connected with it an oil-heater, comprising, preferably, a coil or series of substantially horizontal pipes *d*, located within a substantially horizontally arranged pipe *e*, connected by the branch pipe *f* (see Fig. 2) with the outlet-pipe *g* for the fixing-chamber. The pipe *e* is closed at its front end by a clean-out cap or cover *h* and has its rear end bent and extended down into the hydraulic main *i*, which may be of any suitable or usual construction and is provided with a liquid-outlet pipe *j*, an overflow-pipe *k*, and with a gas-outlet pipe *l*. The series of substantially horizontal pipes *d*, which are shown in Figs. 1 and 3 as four in number and arranged in a substantially vertical plane, constitute a heater in which light or heavy oils employed for enriching the water-gas are heated or vaporized by the gases passing through the outlet-pipe *e* of the fixing-chamber. The individual pipes of the heater are preferably slightly inclined, so that the oil may gravitate through them. The uppermost pipe of the coil or heater is extended through the top or side of the pipe

e and is connected to a suitable source of supply, (not herein shown,) and the lowermost pipe of said heater is also extended through the bottom or side of the pipe *e* and is extended into the carbureter *b*, the said pipe being provided with a valve *m* for controlling the quantity of vapor admitted into the said carbureter or mixing-chamber.

In Figs. 1 and 3 the pipes *d*, comprising the heater, are shown as arranged in a single plane; but I do not desire to limit my invention in this respect, as the number of pipes may be increased and arranged in two or more rows, as represented in Fig. 4, or otherwise arranged, the pipes in said rows being connected at their ends to form a continuous coil through which the oil may flow by gravity from the inlet to the outlet end of said coil.

As a result of the construction and arrangement herein shown a superior quality of carbureted water-gas may be obtained at a minimum expense for the following reasons: The horizontally-disposed oil-heater affords a continuous path through which the oil may flow by gravity, thereby avoiding the formation of oil seals or traps in the individual pipes when the heater is cool or not in use or when the volume of oil is small compared with that of the heater or when the supply of oil is momentarily interrupted, consequently avoiding the necessity of a high pressure to force the oil through the heater, as would be the case if the heater was arranged in a vertical or upright position. By reducing the pressure employed to force the oil through the heater not only is a saving effected in this direction, but what is more important the oil is more completely vaporized, as it is exposed for a longer time to a higher heat, and as a result the vaporized oil admitted into the carbureter *b* is of a higher temperature and in better condition to mix with the water-gas, thereby avoiding the formation or deposit of lampblack and tar, which would not only lower the temperature of the carbureted water-gas passing from the fixing-chamber *c* and through the outlet-pipe *e*, but would also be deposited on the outer surface of the heater, which would necessitate frequent and in practice many times daily cleaning in order that the oil might be properly vaporized, for it will readily be seen that if lampblack or tar is deposited on the pipes of the heater the said pipes would be practically covered with a non-conductor of heat, which would prevent the gases passing through the outlet-pipe *e* from heating the oil to the degree they would if the pipes were not so coated. By heating the pipes of the heater sufficiently hot to properly vaporize the oil therein the formation of lampblack is avoided or largely diminished, and consequently the gases which pass through the outlet-pipe *e* are free or substantially free from carbon, tar, &c., and are hotter and a superior carbureted water-gas is obtained.

Furthermore, by reducing to a minimum the pressure in the main oil-supply line throughout the gas-house the leakage of the oil-lines due to the pressure and the danger from accidental fracture of the oil-lines are reduced to a minimum.

The reduction of tar and lampblack decreases the amount of oil used to make a given candle-power gas.

By reference to Figs. 1 and 2 it will be observed that access can be quickly had to the oil-heater by opening the cap or cover *h*, and by means of the vertical arrangement of the pipes comprising the heater their whole area can be quickly scraped, if necessary. The bent end or vertical portion of the outlet-pipe *e* is provided with a clean-out cover *p* in line with the dip-pipe of the hydraulic main, which affords access to the usual obstructions formed at this point, thereby enabling said obstructions to be quickly and easily removed, as the clean-out opening is close to the water-level of the hydraulic main and the passage is not obstructed by the heater. The generator herein shown is provided with gas-outlet pipes 10 12, an air-blast pipe 13, and steam-pipe 14, all provided with suitable valves, which in practice are manipulated from a platform 15, elevated above the floor 16 of the building, and by reference to Fig. 1 it will be seen that the hydraulic main *i* is located on the platform 15 or on the same level therewith, so that the operator who tends to the valves in the gas-outlet pipes, &c., can from the platform 15 attend to the hydraulic main and draw off its tarry matters at the proper time. It is to be noticed that the horizontally-arranged pipe *e* is connected with the fixing-chamber near its upper end and is not traversed by the blast-gases, which pass up through the fixing-chamber in a substantially vertical path to the stack or chimney through the usual port or mouth in the top of said fixing-chamber, so that the pipe *e* can be opened and the oil-heater cleaned while the apparatus is in use and the different chambers are being heated up by the blast-gases. In other words, the course of the blast-gases through the fixing-chamber is vertically upward and past the mouth of the branch pipe *f*, which creates a suction through the horizontal pipe *e* when the latter is opened for cleaning purposes, which suction is in a reverse direction to the course of the carbureted gas when the latter is passing through the pipe *e*. As a result the pipe *e* may be opened for gaining access to the oil-heater while the apparatus is running without danger of burning or otherwise injuring the workman.

I claim—

1. In a carbureted-water-gas apparatus, in combination, a generator, a carbureter, and a fixing-chamber in communication with one another, said fixing-chamber having at its up-

per end a gas-outlet port adapted to communicate with the chimney or stack for the passage of the blast-gases, a gas-outlet pipe for carbureted water-gas communicating with
 5 said fixing-chamber below said gas-outlet port and provided with a substantially horizontal portion located in a plane above said carbureter, a heater located within said horizontal portion of said gas-outlet pipe and comprising
 10 a series of substantially horizontal pipes arranged at different levels and connected together for the flow of oil from the highest to the lowest pipe, said heater having its inlet-pipe connected with a source of supply of oil
 15 and its outlet-pipe communicating with said carbureter for the gravitation of said oil through said heater into said carbureter, substantially as described.

2. In a carbureted-water-gas apparatus, in
 20 combination, a generator, a carbureter, and a fixing-chamber provided with a gas-inlet at its lower end and with a gas-outlet port at its upper end for the passage of blast-gases, and provided with an outlet-pipe for carbureted
 25 water-gas, communicating with said fixing-chamber below said gas-outlet port and having a substantially horizontal portion located in a plane above the carbureter, and an oil-heater located within said horizontal portion
 30 and extended in the direction of the length of said pipe and communicating with said carbureter, substantially as and for the purpose specified.

3. In a carbureted-water-gas apparatus, in
 35 combination, a generator, a carbureter, and a fixing-chamber provided with a gas-inlet at its lower end and with a gas-outlet port at its

upper end for the passage of blast-gases, and provided with an outlet-pipe for carbureted
 40 water-gas communicating with said fixing-chamber below said gas-outlet port and provided with a substantially horizontal portion located in a plane above the carbureter, and a substantially vertical portion, a hydraulic
 45 main located on substantially the same level as the top of the carbureter and into which said vertical portion extends, a clean-out opening in the vertical portion of said pipe, and a substantially horizontal oil-heater in the horizontal portion of said outlet-pipe, substantially
 50 as described.

4. In a carbureted-water-gas apparatus, in combination, a generator, a carbureter, and a fixing-chamber provided with a gas-inlet at
 55 its lower end and with a gas-outlet port at its upper end for the passage of blast-gases, and provided with an outlet-pipe for carbureted water-gas communicating with said fixing-chamber below said gas-outlet port and provided with a substantially horizontal portion
 60 located in a plane above the carbureter, and an oil-heater arranged within the horizontal portion of said outlet-pipe and communicating with the carbureter to gravitate the oil from the inlet to the outlet end of said heater and
 65 into said carbureter, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WALTER R. ADDICKS.

Witnesses:

JAS. H. CHURCHILL,
 J. MURPHY.