No. 735,011. PATENTED JULY 28, 1903.

A. S. AVERY & C. R. SMITH.

APPARATUS FOR CARBURETING AIR.

APPLICATION FILED MAY 27, 1902.

NO MODEL

2 SHEETS—SHEET 1.

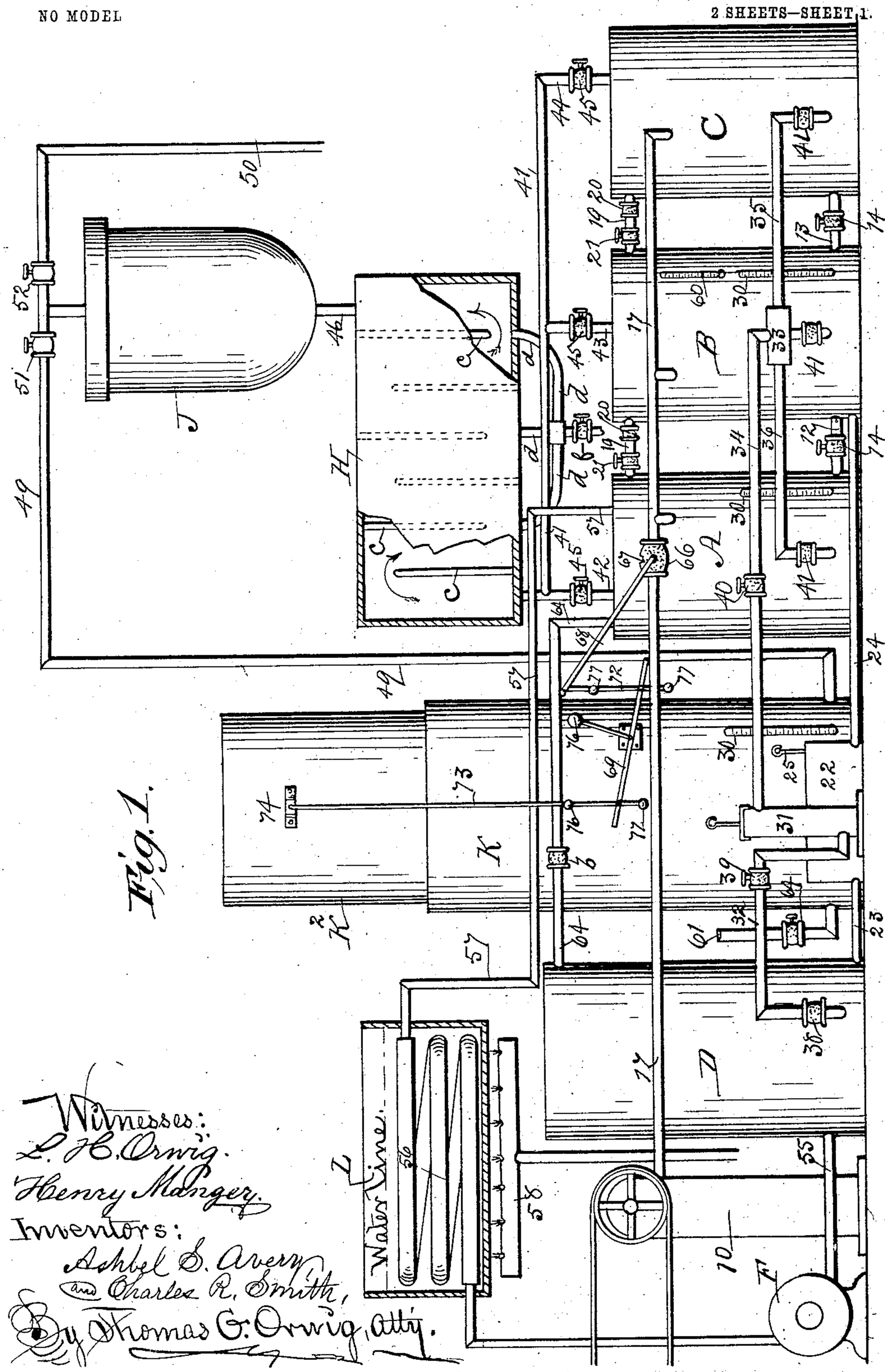

Fig. 1.

Witnesses:
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Henry Manger.

Inventors:
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By Thomas G. Orwig, Atty.

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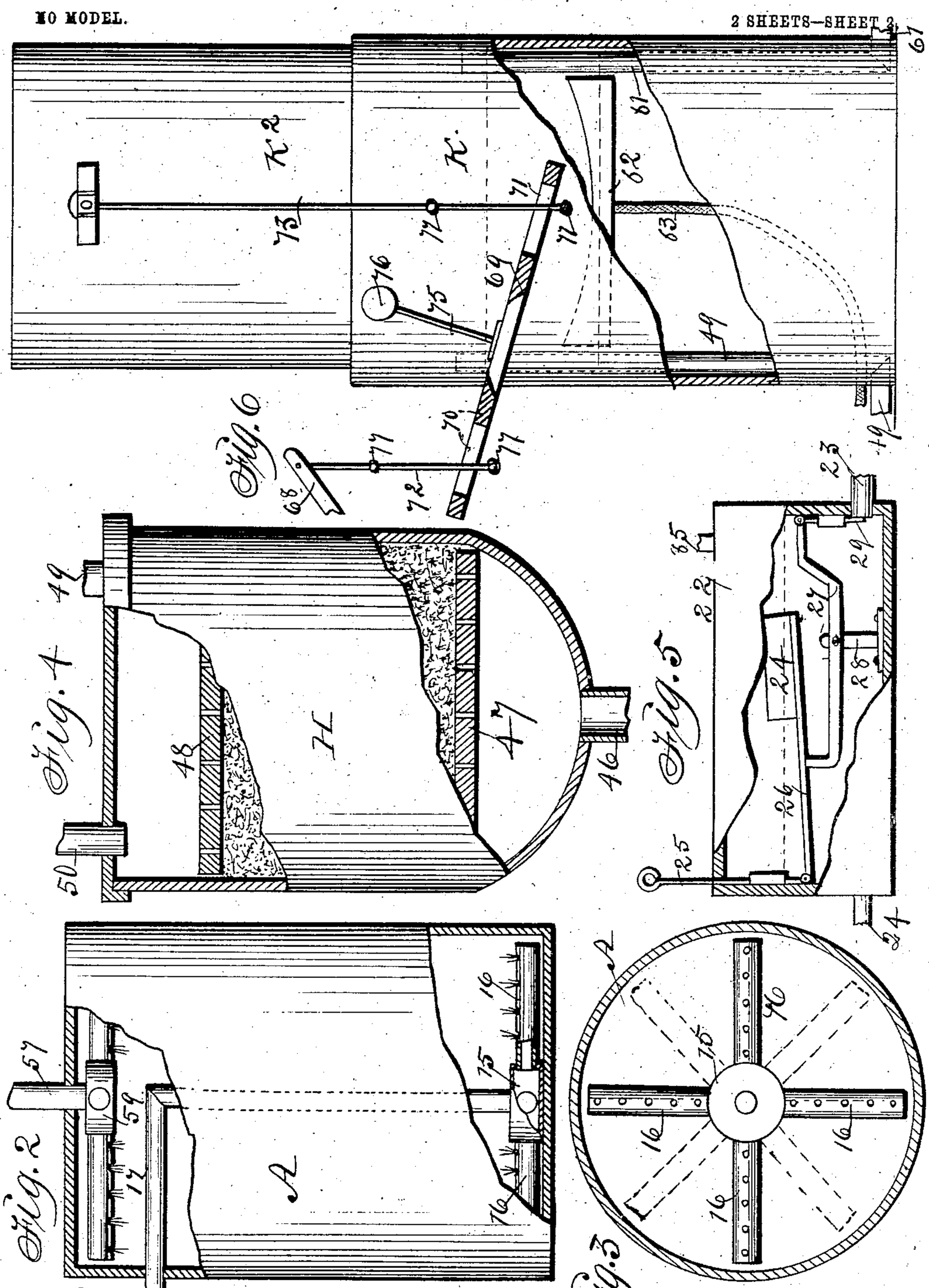

Fig. 6

Fig. 4

Fig. 5

Fig. 2

Fig. 3

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and Charles R. Smith,
By Thomas G. Orwig, Attorney.

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UNITED STATES PATENT OFFICE.

ASHBEL S. AVERY AND CHARLES R. SMITH, OF MANILLA, IOWA.

APPARATUS FOR CARBURETING AIR.

SPECIFICATION forming part of Letters Patent No. 735,011, dated July 28, 1903.

Application filed May 27, 1902. Serial No. 109,141. (No model.)

To all whom it may concern:

Be it known that we, ASHBEL S. AVERY and CHARLES R. SMITH, citizens of the United States, residing at Manilla, in the county of Crawford and State of Iowa, have invented a new and useful Apparatus for Carbureting Air, of which the following is a specification.

Our object is to provide a new and useful apparatus for making inflammatory gas adapted for all the purposes for which an illuminating and heat-producing gas can be utilized, to save time, labor, material, and expense in volatilizing liquid (preferably a light and cheap product or petroleum known as "gasolene") and mingling air therewith, to promote safety and convenience in the making, controlling, purifying, drying, and distributing gas to burners, and to automatically govern the supply as required for any given number of burners and also to regulate the quality as well as the quantity.

Our invention consists in the construction, arrangement, and combination of elements and subcombinations, as hereinafter set forth, pointed out in our claims, and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation showing all the parts connected as required for practical use in delivering gas to a main pipe for distribution or to a supply-pipe and burners connected therewith. Parts are broken away to show interior construction. Fig. 2 is an enlarged vertical sectional view of one of the carbureters and shows an air-distributer in the bottom and a liquid-sprayer in the top. Fig. 3 is a transverse sectional view of a carbureter and an air-distributer in the bottom. Fig. 4 is an enlarged sectional view of the drier. Fig. 5 is an enlarged sectional view of the adjustable float and pressure regulator. Fig. 6 is a detail view of the automatic cut-off mechanism connected with the bell of the gas-holder and the pipe that feeds air to the carbureters.

The numeral 10 designates an air-pump adapted to be connected with a gas-engine or other suitable motor by means of a belt, as indicated in Fig. 1 or in any other practical way.

A, B, and C are carbureters connected at their lower ends by pipes 12 and 13, as shown in Fig. 1. Each of those connecting-pipes has a cut-off valve 14 for closing communication between the carbureters. An air-distributer, preferably in the form of a chamber 15, having tubes 16 extending radially therefrom, as shown in Figs. 2 and 3, is fitted in the bottom of each of the carbureters A, B, and C. A pipe 17 extends from the air-pump 10 and has branches that extend into the air-distributers 15 in the carbureters A B C, as shown in Fig. 2. The tubes 16 are closed at their free ends and perforated on their tops or sides for discharging jets of air into the liquid in which they are immersed. The upper ends of the carbureters A B C are connected with each other by pipes 18 and 19, and each of those pipes is provided with an automatic check-valve 20 and a cut-off valve 21 for regulating communication between the carbureters at their top portions.

When the temperature of the oil is changed by means of the coil 56 in the tank L and the burner 58 and distributed in the top of the carbureter A, the automatic valves 20 in the pipes 19 allow communication between the carbureters A, B, and C, and the cut-off valves 21 in the pipes 19 are open in the direction from A to B and B to C, and when the cut-off valve 21, connected with the pipe 19 between the carbureters B and C, and the cut-off valve 45 in the pipe 44 are closed the automatic valve 20 makes the carbureter C inoperative, so that the carbureters A and B alone will supply the quantity of gas desired, and by then closing the cut-off valves 21 on the pipes 19 between the carbureters A and B and the cut-off valve 45 on the pipe 43 only the one carbureter A will be operative as required to supply a diminished quantity of gas whenever desired. The advantage of thus combining the carbureters in an apparatus as a means of regulating temperature and regulating supply is therefore an important desideratum in the art.

When the three carbureters A, B, and C are simultaneously operated, their products when mingled in the purifier H will be of the same temperature as produced by means of the temperature effected in the oil that is passed through the coil 56 in the tank L.

A supply-tank D for storing gasolene is connected with the carbureters A B C as required for delivering liquid to them and also

for returning surplus liquid from the carbureters to the tank, as hereinafter set forth. A chamber 22 is connected with the tank D by a pipe 23 and with the center carbureter B by a pipe 24 for conveying oil from the tank to the carbureter B and from thence to the carbureters A and C through the connecting-tubes 12 and 13. A float $24\frac{1}{2}$ for regulating the passage of liquid from the tank D to the carbureter B is mounted in the chamber 22 and provided with means for restricting the up and down motions of the float, as shown in Fig. 5 or in any suitable way as required for governing the quantity of oil passed from the tank to the carbureters. A rod 25 is adjustably connected with the chamber, and a rod 26, connected with the float, is pivotally connected with the lower end of the rod 25. A lever 27 is fulcrumed to a fixed support 28, and fixed to the rod 26 and 29 is a valve pivotally connected with the lever and slidably connected with the end of the pipe 23, through which fluid passes from the tank D into the chamber 22 as required for automatically regulating the feeding of liquid to the carbureters A, B, and C. The lever 27 and the rod 26 being rigidly united and the rod pivotally connected with the adjustable rod 25, it is obvious the float and valve connected therewith are simultaneously operated as required to regulate the flow of oil into the chamber 22. A gage 30, connected with each carbureter, shows the amount of oil in each, and for equalizing the amount of oil in the three carbureters and returning any surplus of liquid therefrom to the tank D a pump 31 is connected with the tank by a pipe 32 and with a pipe-coupling chamber 33 by a pipe 34, and the chamber 33 is connected with the carbureter C by a pipe 35 and with the carbureter A by a pipe 36 and the carbureter B by a pipe 37, as shown in Fig. 1 or in any suitable way, in such a manner that when a larger quantity of oil has been fed to the carbureters through means of a temperature-regulator and a sprayer, as hereinafter set forth, the surplus may be readily returned to the tank D.

A check-valve 38 in the pipe 32 normally prevents liquid from passing to the pump 31 from the tank D, but allows the pump to return liquid from the carbureters to the tank. A cut-off valve 39 can be used for closing communication between the pump and the tank D.

A cut-off valve 40 in the pipe 34 closes communication between the pump 31 and the chamber 33, and a check-valve 41 in each of the pipes 35, 36, and 37 closes communication between the chamber 33 and the several carbureters A B C in such a manner that oil can be pumped to and from the carbureters as required to maintain an equal supply of liquid in each carbureter.

A separator H, consisting of an air-tight chamber provided with vertical partitions *c*, that alternately terminate near the bottom and top, is located in a plane above the carbureters, (or otherwise, as may suit best in different places,) has a pipe extended down at one end, and is connected with the tops of the carburters A B C by a pipe 41 and branches 42, 43, and 44, and each branch is provided with a cut-off value 45 as required to cut off communication with the separator whenever desired. The gas that enters the bottom at one end of the separator passes in the serpentine passage produced by the partitions *c* and passes out at the top of the other end through the pipe 46 into the drier J, and any surplus of valuable oil that may be in the gas or other objectionable matter will be precipitated and descend into the draining-tubes *d*, fixed in the bottom of the chamber, from whence it is drawn through a valve *f*.

In a plane above the separator H is located a drier J, constructed as shown in Fig. 4 and connected with the separator H by a tube 46. It preferably has a concaved bottom, and in its lower portion is placed a perforated plate 47, and on top of the plate is placed mineral wool or suitable drying material, and on top of the mineral wool is placed a perforated follower 48. The head or top of the drier is fitted and fixed as shown or in any suitable way as required to close the drier air-tight. A pipe 49 extends from the drier to a gas-holder K, and a pipe 50 is connected with the drier J to be extended to a street-main for distributing gas to supply-pipes that may be connected therewith.

To control the passage of gas from the drier to the gas-holder K, a cut-off valve 51 is connected with a pipe 49, a cut-off valve 52 with the pipe 50, leading to a main, as shown in Fig. 1 or in any suitable way, so that gas may be conveyed direct from the drier to a main or to a gas-holder at the will of the operator.

To regulate the temperature of the gasolene in the carbureters A B C, a pipe 55 is connected with the tank D and extended to a rotary pump F, and from thence to a coil 56 in a water-tank L, and a pipe 57 connected with the other end of the coil and extended into the top of the carbureter A and connected with the sprayer 59, as shown in Fig. 2, so the liquid pumped into the coil and back into the carbureter will be subjected to the action of the water in the tank L. To warm the water in the tank, a gas-burner 58 or other suitable heating device is located under the tank. In place of connecting the pipe 57 with the sprayer in the carbureter A it may be connected with the tank D, as shown in Fig. 1, and the sprayer dispensed with.

The sprayer fixed to the pipe 57, as shown in Fig. 2 or in any suitable form desired, facilitates the mingling of the oil and air as required to produce inflammable gas.

Air passes from the carbureter A into the carbureters B and C through the pipes that connect them, and the air and oil mingled in the three carbureters passes through the

pipes fixed in their tops into the pipe 42 and from thence into the condenser H through the pipe 47.

A thermometer 60, connected with the carbureter B, shows the temperature of the contents as required to direct the operation of the coil 56 in the water-tank L.

To convey gas direct from the gas-holder K, a service-pipe 61 is connected with the gas-holder in a common way to extend upward inside of the gas-holder. The pipe 49 also extends up in the gas-holder K, as shown in Fig. 6, and between the upper ends of the pipes 61 and 49 a float 62 is placed and concaved in its top surface and adapted to receive any condensation that may occur in the bell K^2; and a flexible tube 63, connected with the float and extended out at the lower end of the gas-holder, will carry off such condensation. The service-pipe 61 is provided with a cut-off valve 64, that must be closed when the valve 51 in the pipe 49 is closed and the valve 52 in the pipe 50 is opened for conveying gas direct from the drier J to a main or service-pipe.

To distribute air-pressure from the carbureters A B C to the tank D as required to facilitate circulation of liquid through the chamber 22 and the carbureters, a pipe 64, provided with a valve *b*, is connected with the top portion of the tank D and the carbureter A, as shown in Fig. 1.

To automatically govern the introduction and circulation of air in the carbureters A B C, the pipe 17 is extended from the air-pump 10 and connected with the air-distributers 15 in the carbureters, as shown in Fig. 2, and a valve-chamber 66 is connected with the pipe and provided with a vent 67. An arm 68 projects from the end of a three-way valve fitted in the chamber 66. A lever 69 is fulcrumed to the outside of the gas-holder K or other suitable support and provided with bridles 70 and 71 at its ends and connected with the arm 68 by means of a rod 72, pivoted to the end of the arm and extended down through the bridle 71. An arm 75 projects upward from the center of the lever 69 and carries a weight 76 at its end to impart sudden motion to the lever as required for operating the valve-arm 68 and opening and closing communication between the air-pump and carbureters. Stop devices 77, fixed to the rods 72 and 73 above and below the bridles 70 and 71, contact with the ends of the lever as required to alternately press the ends of the levers up and down, so that when the arm 75 passes a perpendicular line the weight 76 will impart a sudden motion to the lever as required to actuate the arm 58 of the three-way valve fitted in the valve-chamber 66. In position shown in Fig. 1 the bell K^2 is rising and lifting the bridle 71 and moving the weighted arm toward a perpendicular line, and the instant the center of gravity of the weight passes that line the lever will strike the stop 77 on the lower end of the rod 72 and pull down the arm 68 of the valve to close communication between the air-pump 10 and the carbureters and to open the vent 67. A downward motion of the bell K^2 causes a reverse motion of the mechanism as required to reëstablish communication.

It is obvious the dimensions of the various parts may vary as required for producing various quantities of gas for different numbers of patrons, buildings, and business in the buildings. It is also obvious the positions of different parts relative to each other may be changed as required to suit the space in which the apparatus is located.

In the practical operation of our invention oil is fed to the carbureters A, B, and C and the quantity regulated by means of the automatic mechanism in the chamber 22. When it is desirable to change the temperature of the oil and air in the carbureters, oil is pumped into the coil 56 and subjected to the action of the water in the tank L to change the temperature of the contents of the carbureters by conveying oil from the coil into the carbureters to mingle with their contents. The gas thus produced is regulated in temperature. To regulate the quantity of gas that is required for different numbers of burners at different times, each carbureter is independently connected with the separator H, so that the supply is readily governed by means of the valves in the tubes that connect the carbureters with the separator, from which the gas passes through the drier J and from thence direct to a street-main by a pipe 50 or first into the gas-holder and from thence to a service-pipe 61.

The supply of gas conveyed into the gas-holder is automatically regulated by the automatic mechanism connected with the gas-holder and the pipe 17 and valve 66, connected with the air-pump, and the carbureters A, B, and C.

Having thus described the purpose of our invention and the construction, function, and arrangement, combination, and operation of the different elements and subcombinations, the practical operation and utility of the complete apparatus will be understood by persons familiar with the art to which it pertains, and

What we claim, and desire to secure by Letters Patent, is—

1. In an apparatus for making gas, a plurality of carbureters, an air-distributer in the bottom of each carbureter, an air-pump, a pipe connected with the air-pump and the air-distributer in the carbureters, pipes connecting the top portions of the carbureters provided with cut-off valves and also automatic check-valves, pipes connecting the lower ends of the carbureters provided with cut-off valves and means for conveying oil into the carbureters, arranged and combined to operate in the manner set forth for the purposes stated.

2. In a gas-making apparatus, an air-pump, a plurality of carbureters, an air-distributer

in the bottom of each carbureter, a pipe connecting the air-pump with the air-distributers in the carbureters, pipes connecting the top portions of the carbureters provided with cut-off valves and also automatic check-valves, pipes connecting the lower portions of the carbureters provided with cut-off valves, means for feeding oil into the carbureters, a separator and pipes connecting the carbureters with the separator, arranged and combined to operate in the manner set forth for the purposes stated.

3. In a gas-making apparatus, an air-pump a plurality of carbureters, air-distributers in the bottoms of the carbureters connected with the air-pump, pipes connecting the carbureters at their lower ends provided with cut-off valves, pipes connecting them at their tops provided with automatic check-valves and also cut-off valves, means for feeding oil into the carbureters, a condenser, pipes connecting the condenser with the carbureters and a drier connected with the separator, arranged and combined to operate in the manner set forth for the purposes stated.

4. In a gas-making apparatus, an air-pump, a plurality of carbureters having air-distributers in their bottoms, pipes connecting the air-distributers with the air-pump, pipes connecting the carbureters at their lower ends provided with cut-off valves, pipes connecting the carbureters at their tops provided with automatic check-valves and also cut-off valves, means for feeding oil into the carbureters at their bottom portions, a separator, pipes connecting the separator with each carbureter, a drier connected with the separator and means for equalizing the quantity of oil in the carbureters, arranged and combined to operate in the manner set forth for the purposes stated.

5. In a gas-making apparatus, an air-pump, a plurality of carbureters, pipes connecting carbureters at their lower ends provided with cut-off valves, pipes connecting them at their tops provided with automatic check-valves and also cut-off valves, means for feeding and distributing air in the bottoms of the carbureters, a separator, pipes for connecting the separator with the carbureters, a drier connected with the separator, means for equalizing the quantity of liquid in the carbureters, a tank for oil, means for feeding oil into the carbureters at their bottom portions, a separator, pipes for connecting the separator with each carbureter, a drier connected with the separator and means for equalizing the quantity of oil in the carbureters, arranged and combined to operate in the manner set forth for the purposes stated.

6. In a gas-making apparatus, an air-pump, a plurality of carbureters, pipes connecting the carbureters at their lower ends provided with cut-off valves, pipes connecting them at their tops provided with automatic check-valves and also cut-off valves, means for feeding and distributing air in the bottoms of the carbureters and means for spraying oil in the top of one of the carbureters, arranged and combined to operate in the manner set forth for the purposes stated.

7. In a gas-making apparatus, an air-pump, a plurality of carbureters, pipes connecting the carbureters at their lower ends provided with cut-off valves, pipes connecting them at their tops provided with automatic check-valves and also cut-off valves, means for feeding and distributing air in the bottom of the carbureters, a separator, pipes for connecting the separator with the carbureters, a drier connected with the separator, means for equalizing the quantity of liquid in the carbureters, a tank for oil, means for feeding oil into the carbureters, means for returning oil from the carbureters to the tank, and automatic mechanism for regulating the flow of oil from the tank to the carbureters, arranged and combined to operate in the manner set forth for the purposes stated.

8. In a gas-making apparatus an air-pump, a plurality of carbureters having air-distributers in their bottoms connected with the air-pump, pipes connecting the carbureters at their lower ends provided with cut-off valves, pipes connecting them at their tops provided with automatic check-valves and also cut-off valves, means for feeding oil into the carbureters at their bottom portions, a separator, pipes for connecting the separator with each carbureter, a drier connected with the separator, means for equalizing the quantity of oil in the carbureters, a tank for oil, means for returning oil from the carbureter to the tank, automatic mechanism for regulating the flow of oil from the tank to the carbureters and means for conveying air from the carbureters to the top portion of the oil-tank, arranged and combined to operate in the manner set forth for the purposes stated.

9. In a gas-making apparatus, an air-pump, a plurality of carbureters having air-distributers in their bottoms connected with the air-pump, pipes connecting the carbureters at their lower ends provided with cut-off valves, pipes connecting the carbureters at their upper ends provided with automatic check-valves and also cut-off valves, a separator, pipes connecting the separator with the carbureters, a drier connected with the separator, an oil-tank, means for feeding oil from the tank into the carbureters, means for equalizing the quantity of oil in the carbureter, means for returning oil from the carbureters to the tank, automatic mechanism for regulating the flow of oil from the tank to the carbureters, means for conveying air from the carbureters to the top portion of the liquid-tank and means for regulating the temperature of oil in the carbureters, arranged and combined to operate in the manner set forth for the purposes stated.

10. In a gas-making apparatus, three car-

bureters, pipes connecting them at their top portions provided with cut-off valves and automatic check-valves, pipes connecting them at their bottom portions provided with cut-off valves, an oil-tank, an air-tight chamber connected with the tank, a lever in the chamber, a float connected with the lever, means for restricting the motion of the float and lever, a valve on the end of the lever for regulating the flow of liquid into the chamber, and a pipe connected with the chamber and one of the carbureters, arranged and combined to operate in the manner set forth for the purposes stated.

11. In a gas-making apparatus, three carbureters, pipes connecting the carbureters at their bottom portions provided with cut-off valves, pipes connecting the carbureters at their top portions provided with automatic check-valves and also cut-off valves, an oil-supply tank, an air-tight chamber connected with the tank, a lever in the chamber, a float connected with the lever, means for restricting the motion of the float and lever, a valve on the end of the lever for regulating the flow of liquid into the chamber, a pipe connected with the chamber and one of the carbureters and a pump connected with the supply-tank and one of the carbureters, arranged and combined to operate in the manner set forth for the purposes stated.

12. In a gas-making apparatus, a plurality of carbureters connected at their top and bottom portions, an oil-tank, a pump connected with an oil-supply tank, means for feeding oil from the tank to the bottom of the carbureters, a water-tank, a spraying device in the top of one of the carbureters, a pipe extended from one end of the coil to a rotary pump, a rotary pump, a pipe extended from the pump to the oil-tank and a pipe extended from the coil to the spraying device in the top of the carbureter, arranged and combined to operate in the manner set forth for the purposes stated.

13. In a gas-making apparatus, a plurality of carbureters connected at their top and bottom portions, an oil-tank, means for feeding oil from the tank to the carbureters, means for heating oil, means for conveying heated oil into the carbureters and means for spraying the heated oil in the top of a carbureter, arranged and combined to operate in the manner set forth for the purposes stated.

14. In a gas-making apparatus, a plurality of carbureters, a gas-holder, means for conveying gas from the carbureters to the gas-holder, an air-pump, a pipe extended from the air-pump to one of the carbureters, a valve-chamber connected with said pipe and provided with a vent, a three-way valve fitted in the valve-chamber and provided with an arm, a lever having bridles at its ends and an arm projecting upward from its central portion, a weight on the end of the lever, a rod connected with the bell of the gas-holder and extended through the bridle at one end of the lever and provided with fixed stops and a rod connected with the arm of the three-way valve and extended through the bridle at the other end of the lever and provided with fixed stops, arranged and combined to operate in the manner set forth for the purposes stated.

15. A gas-making apparatus comprising a plurality of carbureters having air-distributers in their bottoms, pipes connecting the carbureters at their bottoms provided with check-valves, pipes connecting the carbureters at their top portions provided with automatic check-valves and also cut-off valves, an air-pump, a pipe connecting the air-pump with the air-distributers in the carbureters, an oil-supply tank, means for feeding oil from the tank to the bottoms of the carbureters, a separator connected with the three carbureters, a gas-drier connected with the separator, a gas-holder connected with the drier, a water-tank, a coil in the water-tank, a pipe connecting the coil with a rotary pump, a rotary pump, a pipe extending from the pump to the oil-tank, means for heating water in the tank, a pipe extended from one end of the coil to a sprayer located in the top of one of the carbureters, means for automatically regulating communication with the air-pump and the carbureters, arranged and combined to operate in the manner set forth for the purposes stated.

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