C. FOX, DEC'D.

J. C. ECKERT, ADMINISTRATOR.

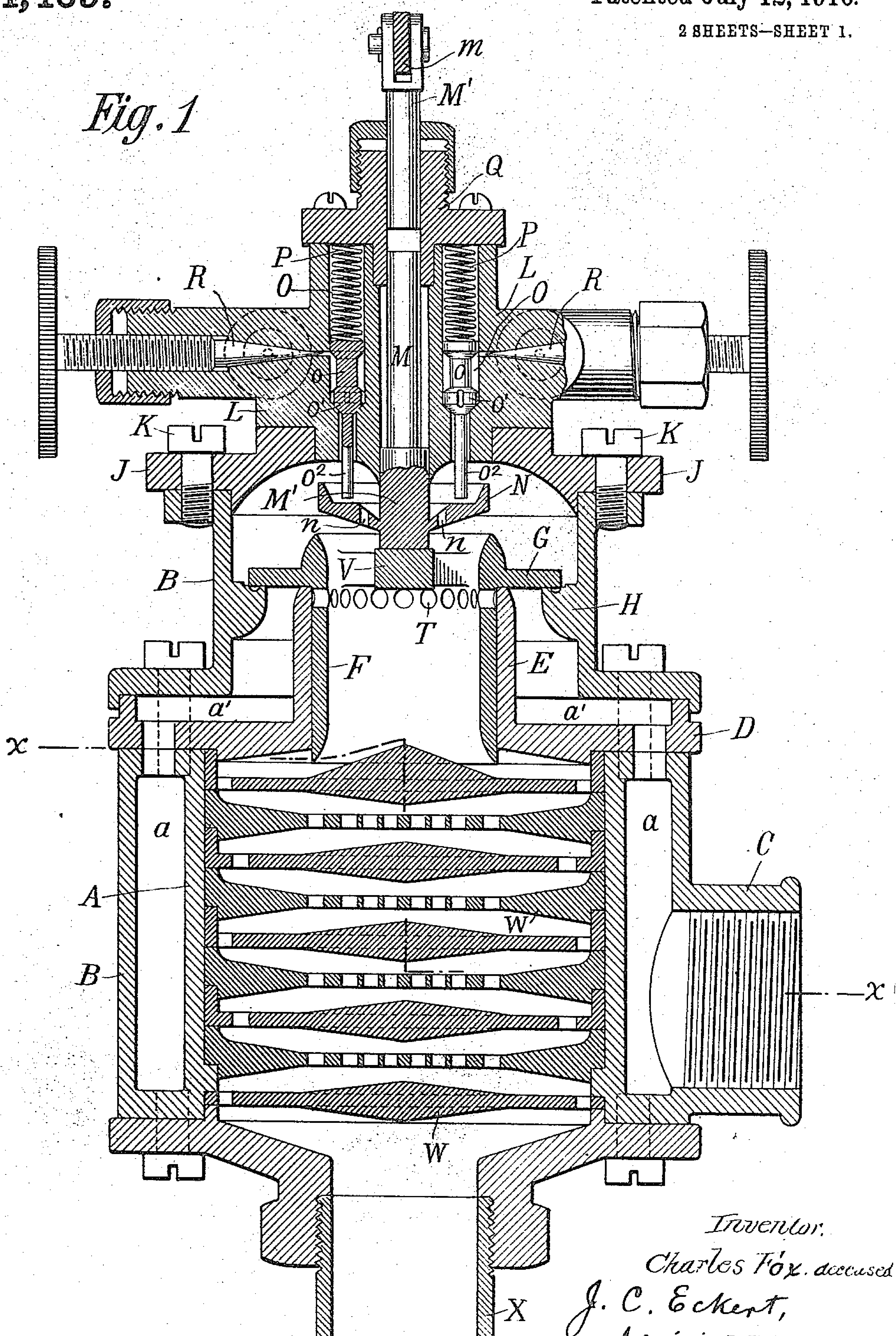
CARBURETER.

APPLICATION FILED APR. 17, 1908.

964,409. Patented July 12, 1910.

2 SHEETS—SHEET 1.

Fig. 1



Inventor.
Charles Fox, deceased
J. C. Eckert,
Administrator

Witnesses:
Raphaël Netter
John A. Engel

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Fig. 3

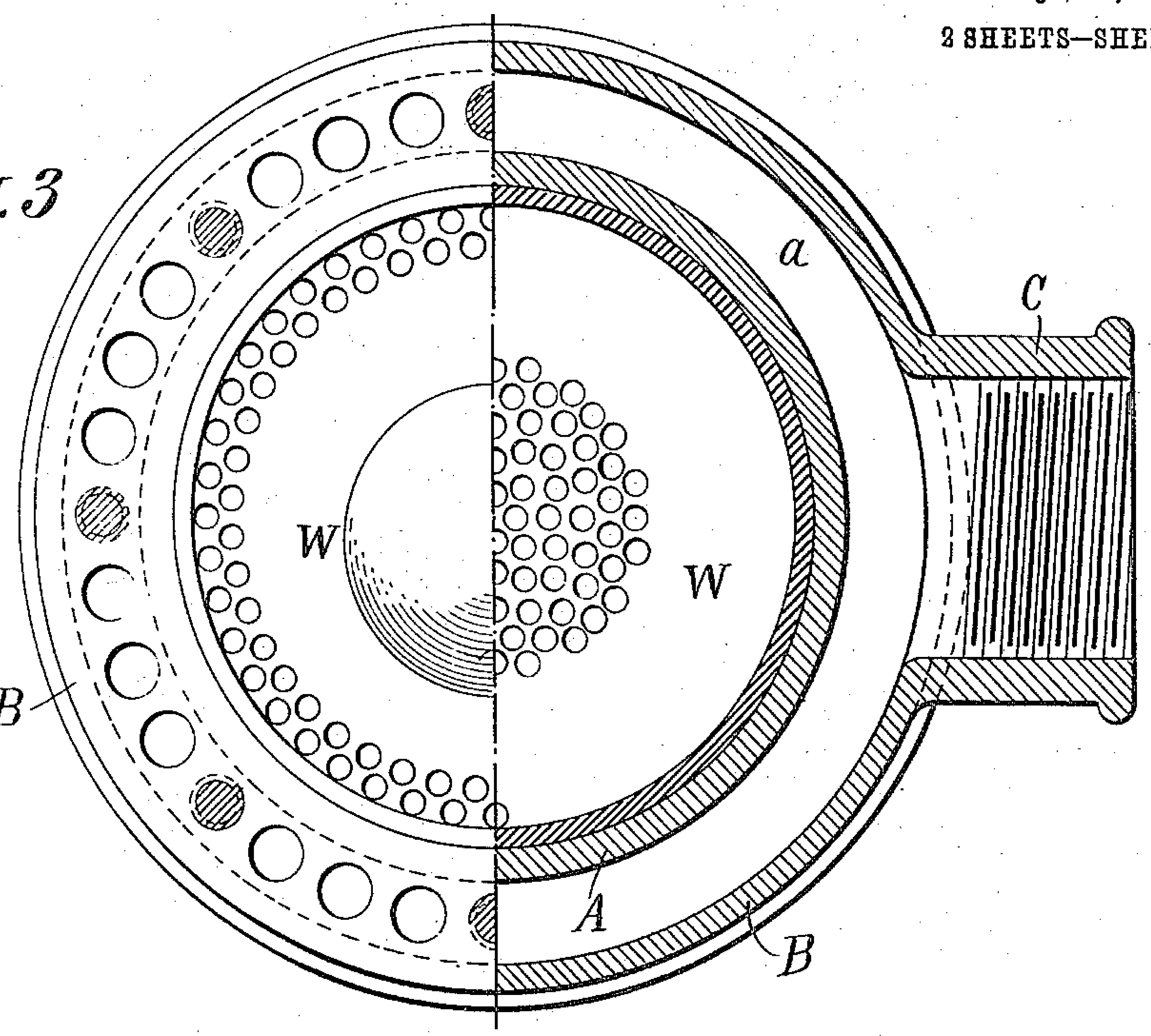
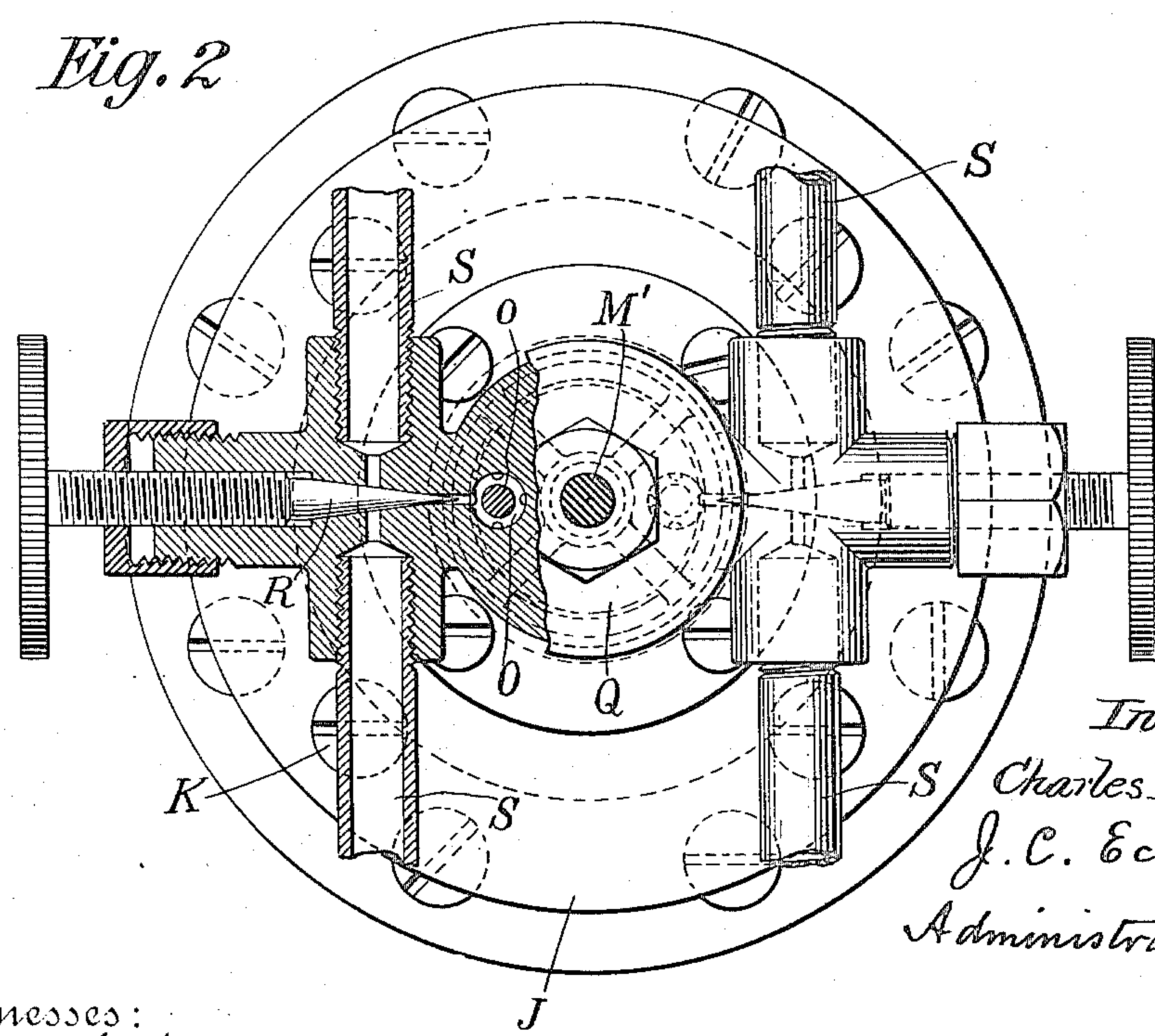


Fig. 2



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UNITED STATES PATENT OFFICE.

JAMES CLENDENIN ECKERT, OF STAMFORD, CONNECTICUT, ADMINISTRATOR OF CHARLES FOX, DECEASED.

CARBURETER.

964,409. Specification of Letters Patent. Patented July 12, 1910.

Application filed April 17, 1908. Serial No. 427,722.

To all whom it may concern:

Be it known that Charles Fox, deceased, late a citizen of the United States and a resident of Stamford, in the county of Fairfield and State of Connecticut, invented certain new and useful Improvements in Carbureters, of which the following is a specification, reference being had to the drawings accompanying and forming part of the same.

The invention, subject of the present application, relates to devices for producing explosive mixtures of air and hydrocarbon, and is in the nature of an improvement on the carbureter described in a prior application of Charles Fox filed on the 20th day of February, 1906, bearing Serial No. 301,985. The present invention, while embodying the underlying principles of construction and mode of operation of the device described in the said prior application, is more effective in operation and in some respects more simple in design. As the improvements reside largely in the construction of parts or elements entering into the combination of the prior application they will be more readily understood when described in connection with the annexed drawings, in which—

Figure 1 is a central vertical section of the complete carbureter. Fig. 2 is a view partly in plan and partly in section, of the device shown in Fig. 1, and Fig. 3 is a section on line x—x of Fig. 1.

A designates the mixing chamber of the carbureter, which is, preferably, cylindrical in form. Surrounding the mixing chamber is an outer casing B, preferably of similar form, large enough in diameter and height to leave an air space or chamber around and above the mixing chamber, as shown at a, a' for the passage of air admitted through a pipe C.

The top of the mixing chamber A is formed by a plate D, having a central aperture surrounded by an upwardly extending tubular neck E in which is fitted a cylindrical valve-member F capable of a reciprocating movement in said neck. At the upper end of the said valve-member is an outwardly extending or horizontal flange G adapted to seat, when the valve-member is in its lowermost position on the upper edge of the neck E, and also on a shoulder or flange H, on the surrounding wall of the upper portion of the casing B. In order to prevent pounding of the valve upon its seats, an annular groove, very slightly greater in diameter than the flange G, is slightly lower than the face of the shoulder, H, and the inner edge of the shoulder is slightly lower than the fact of the shoulder, whereby a certain amount of air will be trapped by the flange in its descent, thus forming a cushion for the same. It will be seen that when the valve-member is in its normal position, as shown in Fig. 1, the annular passage through which air is drawn through port G is closed.

The upper and somewhat constricted portion of the casing B is closed by a plate J, secured by screws K, mounted upon said plate J, and extending into the central aperture therein, is a chambered casting L, constructed as hereinafter described, to contain the controlling and needle valves. Through the center of the casting L is a vertical bore containing a stem M provided with or carrying at its lower end an enlarged and upturned flange N, in form resembling an inverted umbrella, provided with an annular row of perforations n, adjacent to the stem. The stem M rests normally upon and is supported by the solid center of a spider V, extending across the upper portion of the cylindrical valve-member F.

On opposite sides of the central bore in casting L and parallel therewith chambers O are drilled, the lower portions of which are of reduced diameter, and having the shoulders at the top of such reduced portions beveled to form tapering valve seats, as shown. Each of the valves coöperating with the seats just referred to is composed of a body o having flanges o' fitting the chamber in which they work, and a stem o^2 extending down through the casting L. The lower flange of each valve is notched at its edge, as shown, and its underside is formed to fit the tapering valve seat before referred to. Above the valves are spiral springs P retained in place by a cover Q and serving to hold the valves normally on their seats, as will be readily understood.

R, R are needle valves controlling openings from the chambers O, O. In communication with these openings are suitable ducts or pipes S, S, connected with one or more vessels containing the liquid or liquids which are to be utilized for producing the explosive mixture. In the construction described it will be seen that even if the needle valves be open to admit the liquid into the chambers O the liquid cannot flow into the interior of the casing B, unless the valves o are lifted (in the manner hereinafter described) and the lower ends of the notches in the flanges o' thereby opened.

In the mixing chamber there is shown a series of baffle plates W, of which alternate plates are apertured at their edges and the intermediate plates at their centers. To the bottom of the mixing chamber a pipe X is connected, through which the explosive charges are drawn into the engine.

The construction of the device and its various parts having been explained, the functions and operations of the same will now be readily understood.

It is, of course, assumed that the carbureter is used in connection with an internal combustion engine or the like, and that the air which enters at C is drawn through the device and into the engine by the suction produced by the movement of the engine pistons. It is also to be assumed that this air is heated before entering the mixing chamber, either by the heat of the engine exhaust or by any other suitable means, not shown. When the engine, having been started in the usual way, is running normally, the operation is or appears to be as follows: By the movement of a piston in the engine a partial vacuum is created in the mixing chamber A and in the space above the flange G of the valve member F. The pressure of the air in the annular chamber a, therefore, lifts the said valve-member against the force of gravity and raises the flange G from its seat. The lifting of the valve-member F raises the stem M and the engagement of the upturned flange N with the valve stems o^2—between which and said flange there is a slight clearance to enable the valves o to rest firmly in their tapered seats—raises said valves o. One or more of the needle valves R, being open to admit liquid hydrocarbon into the annular spaces between the flanges of the valves o, a charge of this liquid is drawn down through the valves, around stems o^2 and discharged upon the umbrella or mushroom shaped flange N, and spreading over the same passes down through the perforations therein. In this way the charges of liquid hydrocarbon are thoroughly diffused, an action which, as it will be understood, is greatly facilitated and quickened when the surfaces over which it flows become heated. The valve-member F in addition to controlling the admission of hydrocarbon controls also the admission of air. The lifting of the valve is followed by an inrush of heated air through the annular port covered by the flange G. This air coming in contact with the diffused hydrocarbon takes it up in the form of spray, carries it down through the central passage or port in the valve F into the mixing chamber. The greater proportion of the air enters the mixing chamber in the manner just described, but the remainder of each charge is admitted through a series of apertures T in the sides of the cylindrical valve body F immediately below the flange G, which apertures, as will be seen, are uncovered as the valve F rises. This portion of the charge of air meets the main portion, which is carrying the hydrocarbon, and being directed into the descending current the two are commingled. In the mixing chamber the union of the air and the hydrocarbon is completed, and the resulting explosive mixture passes to the engine by way of pipe X. As soon as the engine ceases to draw air from the carbureter, the valve F, of course, falls under the combined influence of gravity and the reaction of the compressed springs P, and this movement not only serves to cut off the further admission of air from the port C, by causing the flange G to close the annular port around the neck E, but also permits the valves o to close under the influence of their springs and so shut off the supply of hydrocarbon at the tapered seats o'. The annular spaces between the flanges of valves o being always in communication with the needle valves are kept filled with hydrocarbon. The quantity of hydrocarbon admitted to the carbureter for each charge depends, as will readily be seen, upon the range of movement of the stem M, and the consequent duration of the intervals during which the valves are open, or lifted from their seats. The range of movement of the stem can be regulated in any convenient way, the means illustrated for the purpose in the present case being a plunger M' working in the central bore in the casting L and controlled by a lever m. By the vertical adjustment of this plunger, more or less play of the stem M is permitted.

In starting the device in operation a highly volatile hydrocarbon, such as gasolene, should of course be used; but after the carbureter has become well warmed up the supply of gasolene may be cut off and a heavier or less volatile hydrocarbon, such as alcohol, kerosene, or even petroleum distillate may be used. For this purpose the ducts or pipes S connected with one of the chambers O are connected to a vessel or vessels containing gasolene or similar hydrocarbon, while the vessel to which the other ducts S are connected contains the hydrocarbon to be used on starting. By having separate vessels for the several ducts or pipes a mixture of two, three or four different hydrocarbons can be used, in which case the relative proportions of the constituents of the mixture can be regulated by means of suitable valves, not shown, in the pipes S.

As has been stated above, the underlying principles of construction and operation of this device are those set forth in the prior application of Charles Fox, filed February 20th, 1906, before referred to; but as the present application is based solely upon improvements on the device of the prior application the said improvements are claimed herein without reference to the specific form of carbureter to which they are or may be applied. The valve-member F, for example, which, on account of its construction, may be designated as a double ported valve, not only performs a double function, but dispenses with a spring within the carbureter, which, from exposure to high temperatures, is liable to lose its resilience and force, and embodies features of novelty and utility aside from those availed of in its application to the specific form of device herein shown.

What is claimed as the invention of the said CHARLES FOX is:

1. In a carbureter, the combination of a mixing chamber having an inlet, an outer casing containing an annular air port around said inlet, a hollow cylindrical valve body provided with a flange covering said port, and with a series of ports in its side walls, the said valve being adapted to be raised by suction within the mixing chamber and by its movement to admit air thereto through both its central bore and the ports in its side walls, as set forth.

2. In a carbureter, the combination of a mixing chamber having an air inlet formed through an upwardly extending neck, an outer casing providing an annular port around said neck, a hollow cylindrical valve body working in said neck provided with a flange covering the annular port and with a series of ports in its side walls, the said valve being adapted to be raised by suction within the mixing chamber and by its movement to admit air thereto through both its central bore and the ports in its side walls, as set forth.

3. In a carbureter, the combination of a mixing chamber having a tubular neck constituting an inlet, an outer casing inclosing said neck and provided with an annular air port around the same, a gravity valve working in said neck and composed of a hollow cylindrical body provided with a flange covering the annular port and with a series of ports in its side walls, the said valve being adapted to be raised by suction within the mixing chamber and when so raised to open the annular port and carry the side ports above the neck, as set forth.

4. In a carbureter, the combination of a mixing chamber having an air inlet, a hollow valve body working in said inlet, and controlling by its movement the admission of charges of hydrocarbon and air through its bore into the mixing chamber, and provided with ports in its side walls for admitting air to the mixture of hydrocarbon and air within the bore of the valve, as set forth.

5. In a carbureter, the combination with a mixing chamber having a tubular neck constituting an air-inlet, of an outer casing providing an annular air-port around said neck, means for delivering hydrocarbon to the mixing chamber through said air-inlet, and a valve adapted to reciprocate in said tubular neck, provided with a flange spanning the said annular air-port and having a central opening for admitting air and hydrocarbon to the mixing chamber and one or more lateral ports for admitting air to the air and hydrocarbon flowing through the central opening, as set forth.

6. In a carbureter, the combination of a valve controlling the flow of air through the carbureter, a member adjacent to said valve for delivering hydrocarbon to the carbureter, a stem arranged to reciprocate in said member and arranged to be actuated by said valve, means carried by the stem for receiving and diffusing the hydrocarbon delivered by the said member, and a valve dependent for actuation upon the movement of said stem for controlling the delivery of hydrocarbon onto the diffusing means, as set forth.

7. In a carbureter, means for delivering hydrocarbon thereto comprising a member having a bore extending through the same and having a hydrocarbon chamber open at a point adjacent to one end of said bore, a stem arranged to reciprocate in said bore, a flange on the stem arranged to receive the hydrocarbon from the said chamber, and a valve in the chamber controlling the delivery of hydrocarbon therefrom and arranged to be actuated by the movement of the said flange; in combination with a valve arranged to control the flow of air through the carbureter and to actuate said stem, as set forth.

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