No. 862,855. PATENTED AUG. 6, 1907.

J. STUBBERS.

CARBURETER.

APPLICATION FILED APR. 6, 1906.

3 SHEETS—SHEET 1.

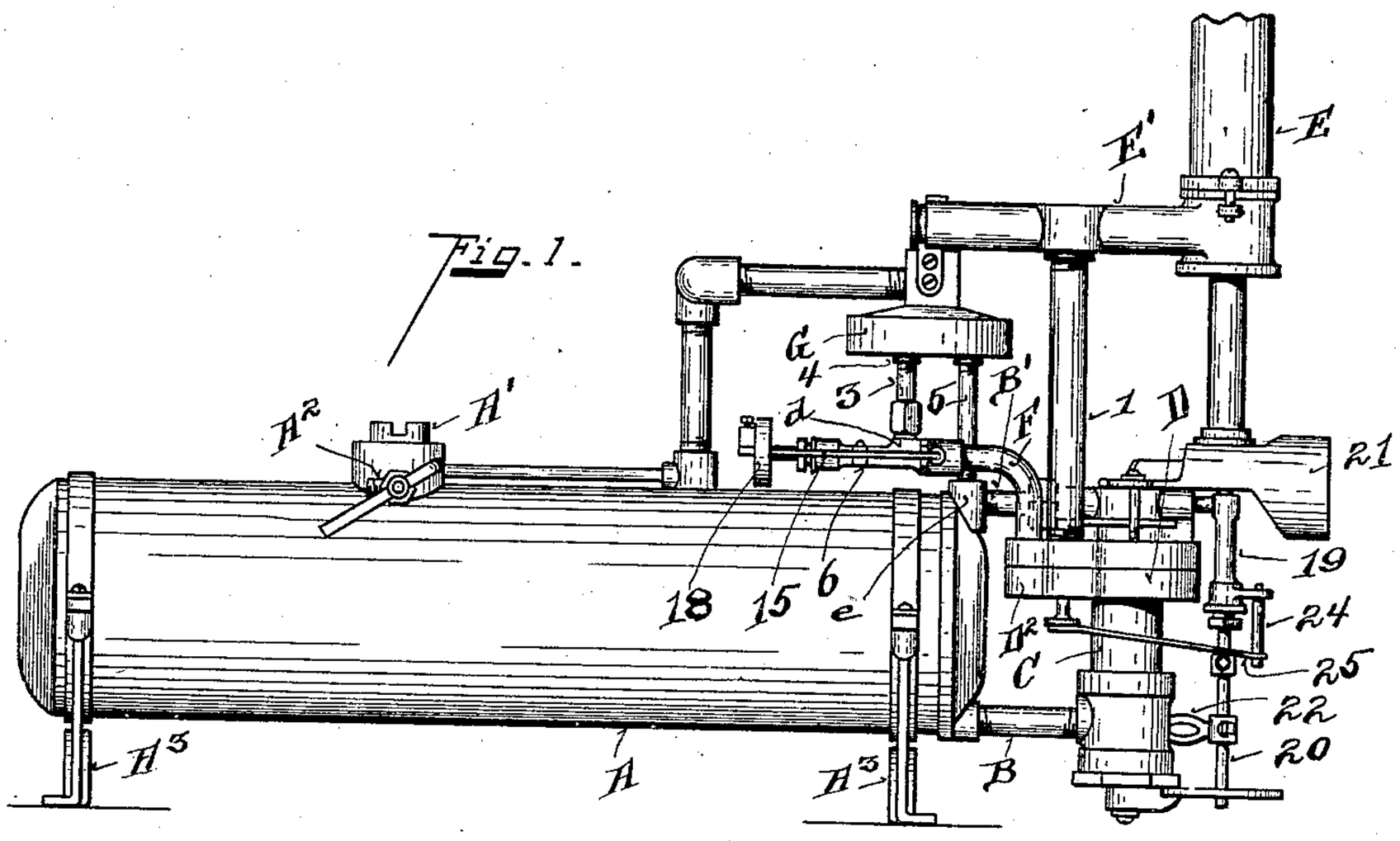

Fig. 1.

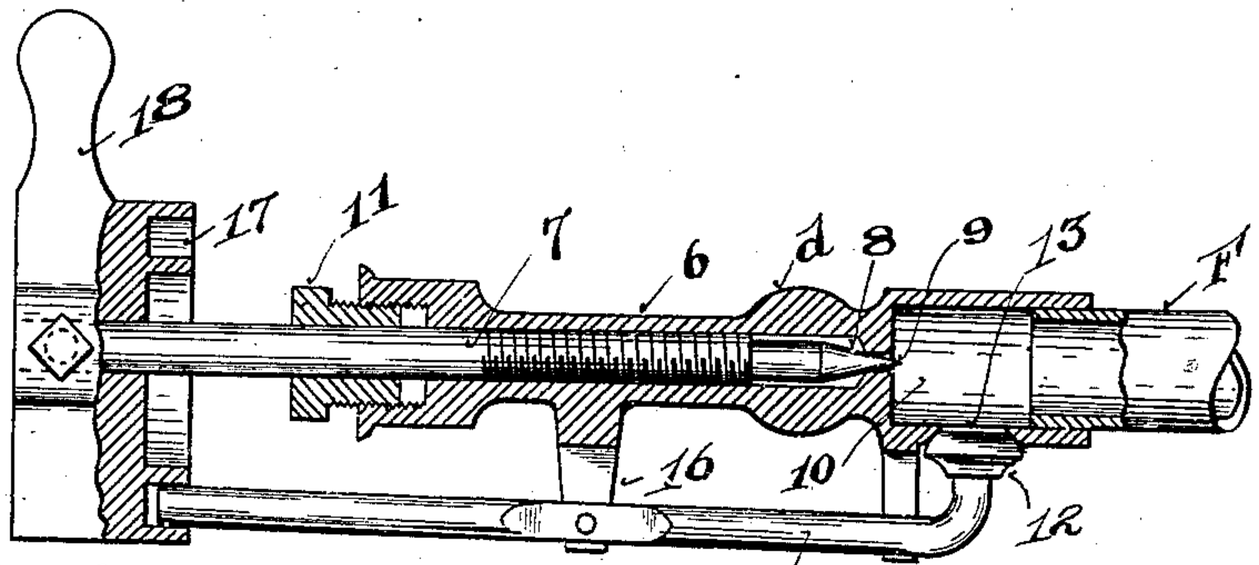

Fig. 2.

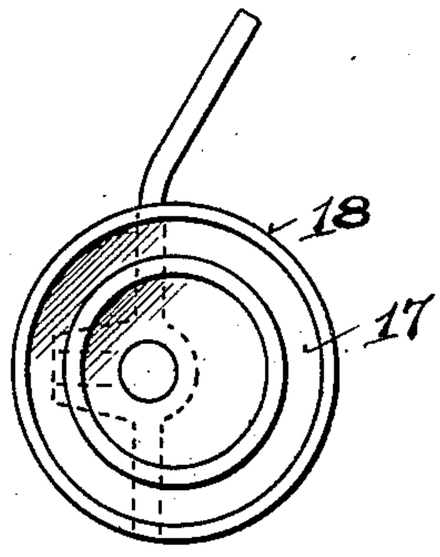

Fig. 3.

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3 SHEETS—SHEET 2.

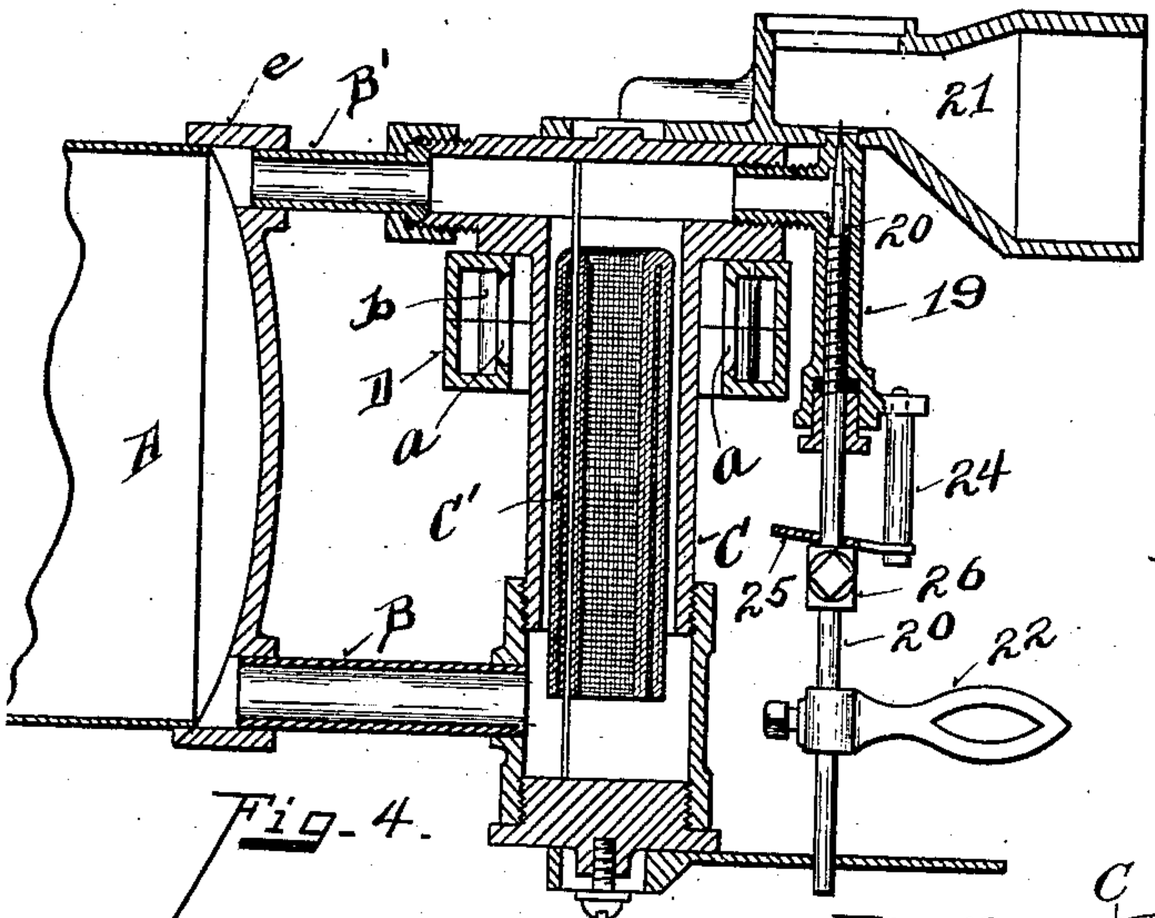

Fig. 4.

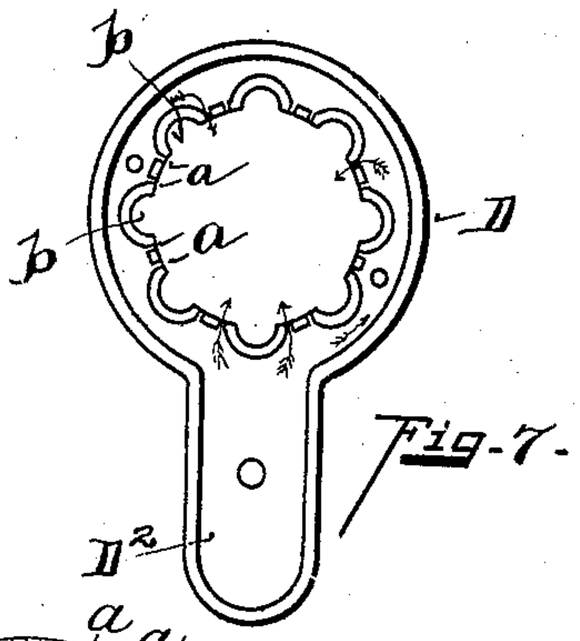

Fig. 7.

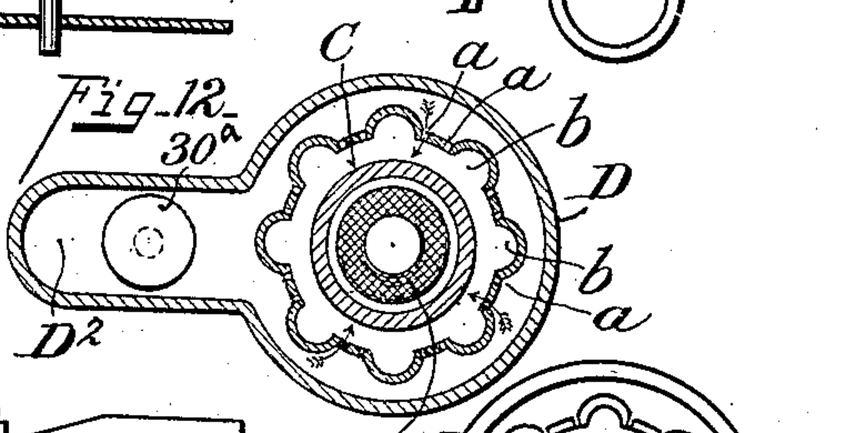

Fig. 12.

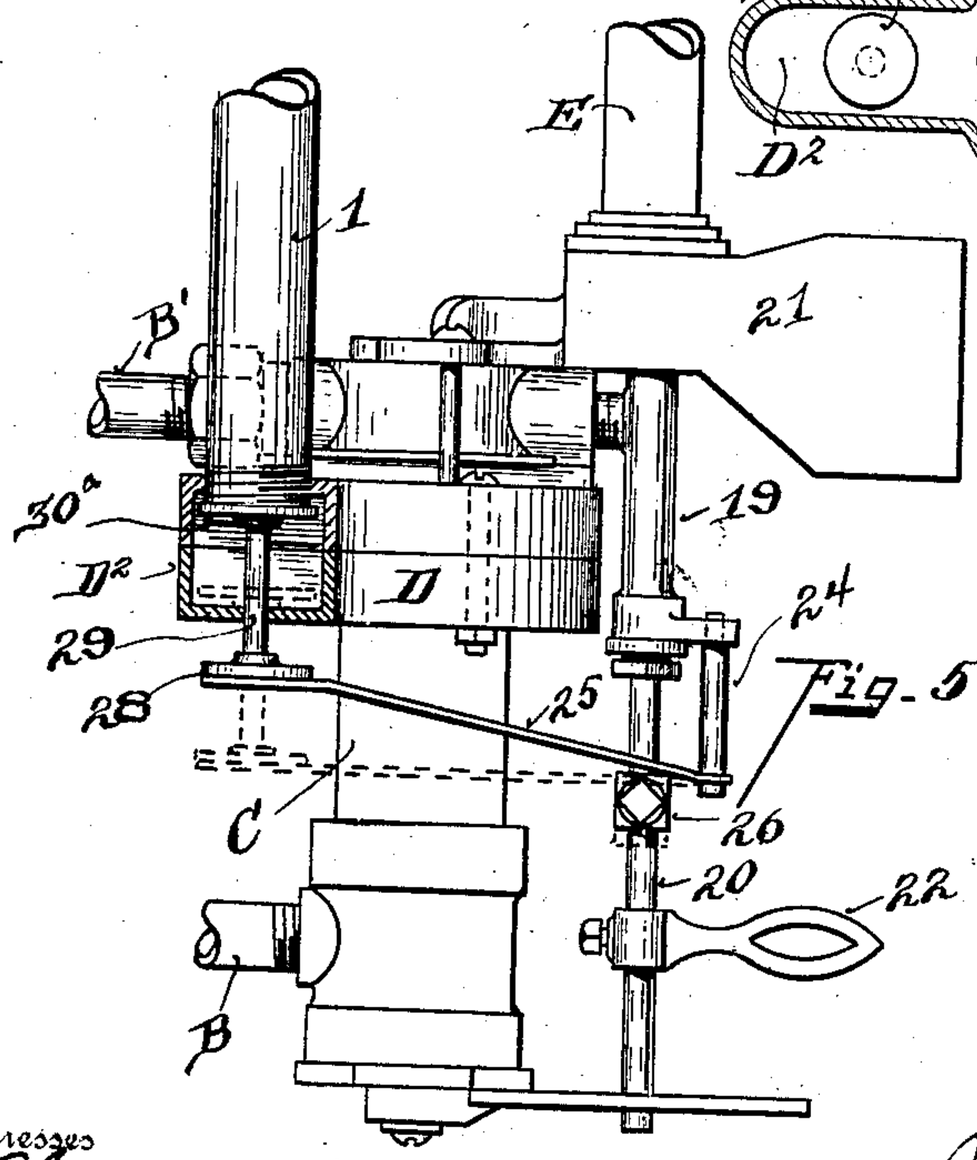

Fig. 5.

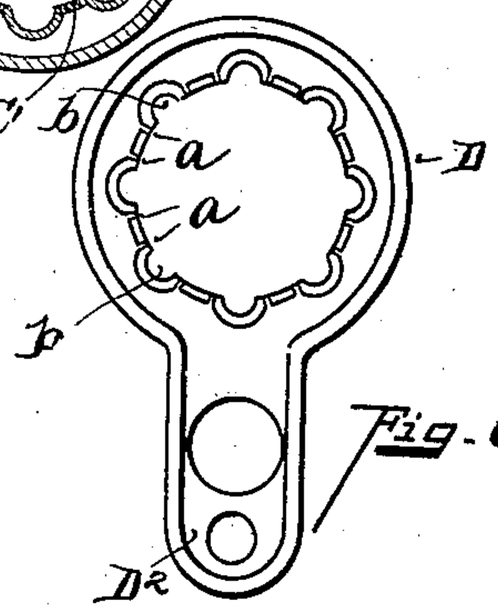

Fig. 6.

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3 SHEETS—SHEET 3.

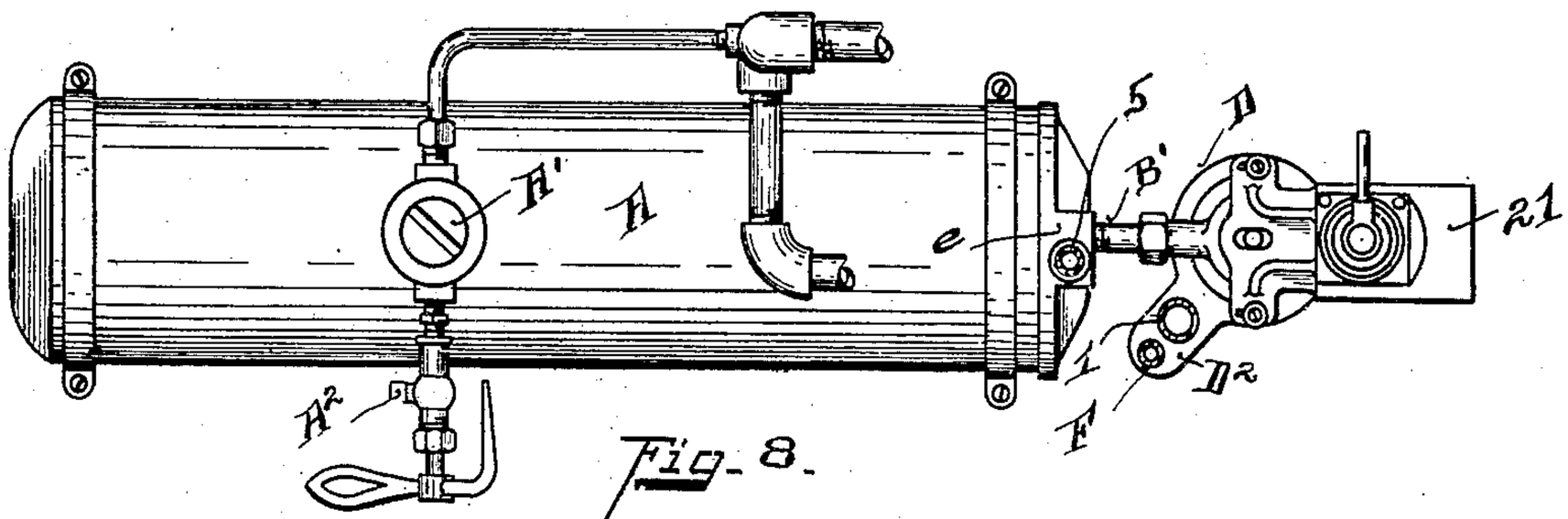

Fig. 8.

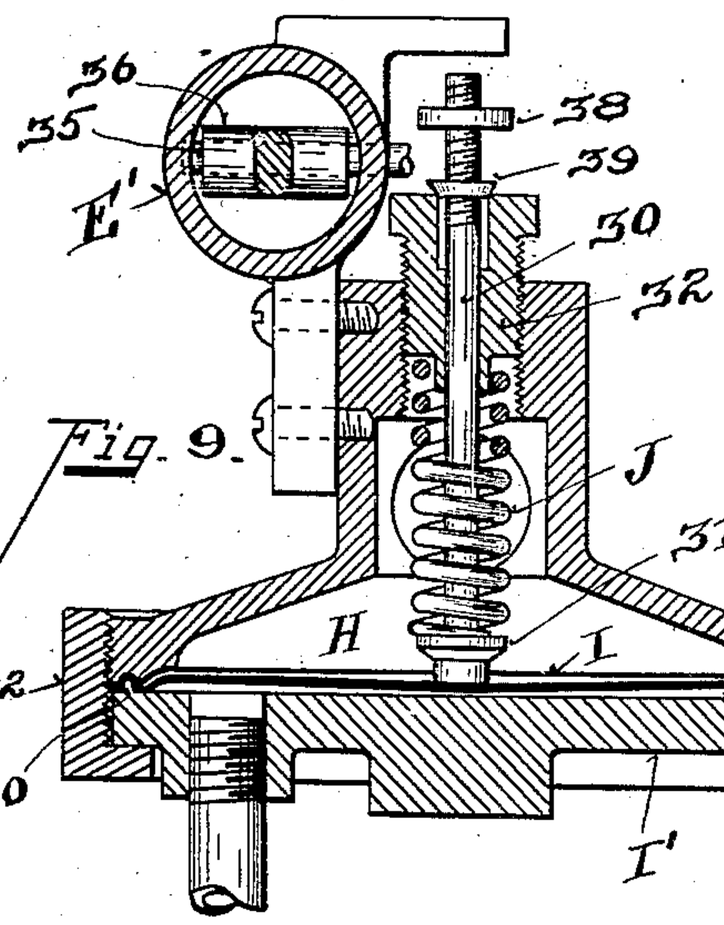

Fig. 9.

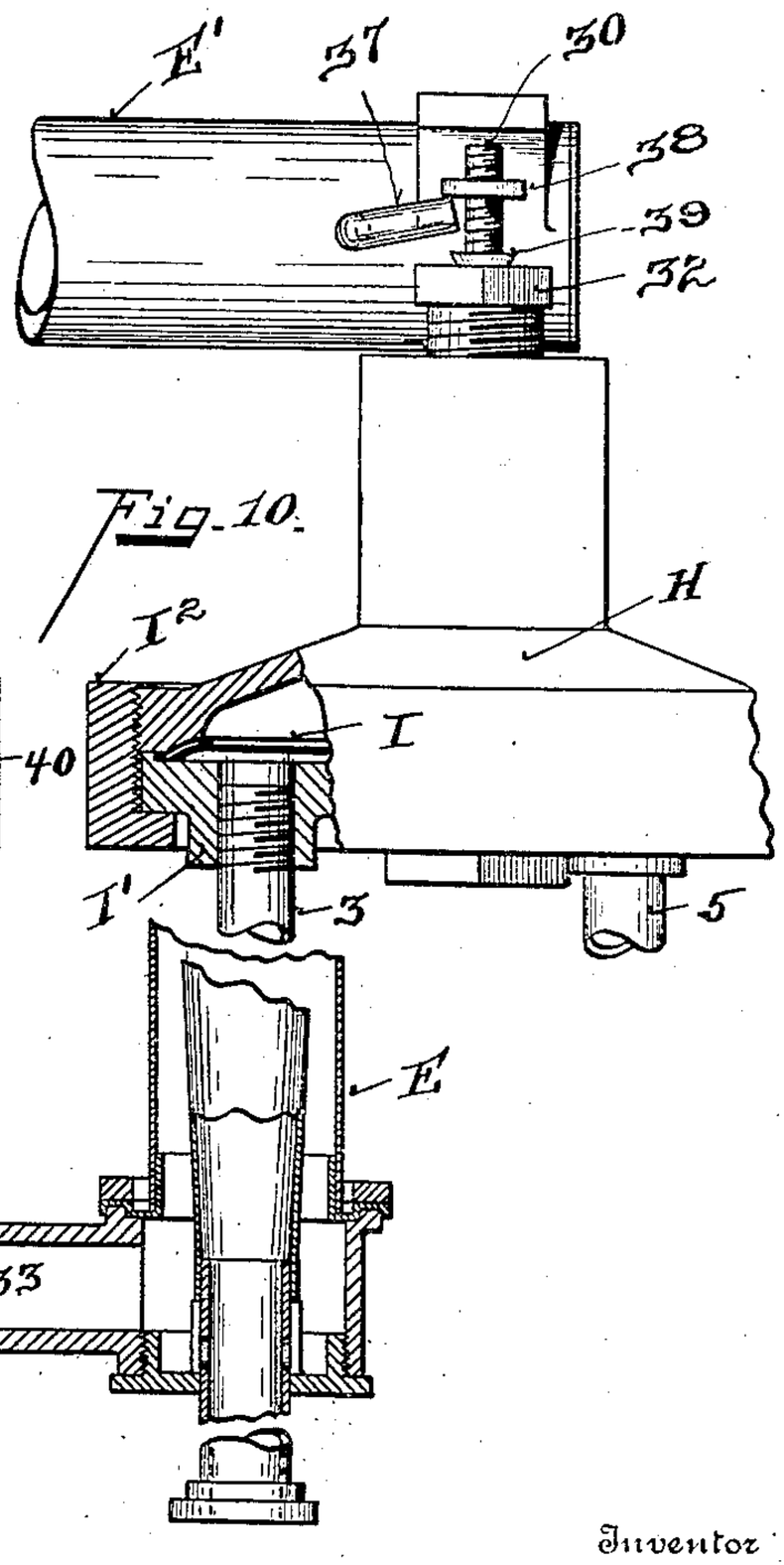

Fig. 10.

Fig. 11.

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UNITED STATES PATENT OFFICE.

JOSEPH STUBBERS, OF COVINGTON, KENTUCKY, ASSIGNOR TO THE INCANDESCENT LIGHT & STOVE COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

CARBURETER.

No. 862,855. Specification of Letters Patent. Patented Aug. 6, 1907.

Application filed April 5, 1905. Serial No. 254,021.

To all whom it may concern:

Be it known that I, JOSEPH STUBBERS, a citizen of the United States, residing at Covington, in the county of Kenton and State of Kentucky, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

The principal object of my invention is, first, to make a generator that can be quickly heated. Second; to provide a generator that requires but little gas to keep it heated, the construction being such that the maximum degree of heat of the flame of the sub-burner is concentrated around the generator.

Another object of my invention is to provide means for initially heating the generator by supplying gas to the sub-flame burner.

Other objects of my invention relate to automatically opening and closing the sub-flame supply pipe by operating the needle valve which controls the supply of gas to the service pipe.

Another object of my invention is to provide means for automatically regulating the amount of air supplied and mixed with the vapor in the initial heating pipe.

Other features of my invention are more fully set forth in the description of the accompanying drawings, forming a part of this specification, in which:—

Figure 1 is a side elevation of my improvement in position for use. Fig. 2 is an enlarged section, partly in elevation of the needle valve for supplying the initial heating pipe. Fig. 3 is a plan view of the cam and lever, shown in Fig. 2. Fig. 4 is an enlarged central vertical section of the generator and the tank connection, with the needle valve and lever, shown in elevation. Fig. 5 is an elevation of the generator, shown in Fig. 4. Fig. 6 is an inside plan view of the top part of the generator or sub-flame burner. Fig. 7 is an inside plan view of the lower half of said burner. Fig. 8 is a top plan view of the tank, shown in Fig. 1, and the connections thereto. Fig. 9 is an enlarged central vertical section of my improved governor. Fig. 10 is an enlarged elevation, partly in section, showing the connections of the governor with the branch of the service pipe and the valve stem. Fig. 11 is a longitudinal vertical section, partly in elevation of the mixer, the sub-flame supply pipe, and the governor valve for cutting off the supply of gas to the sub-flame burner. Fig. 12 is a horizontal section through the burner.

A represents the tank of ordinary construction, one or more of which may be used, as desired.

A′ represents the filling plug.

A^2 represents the air supply pipe, through which air is pumped to create pressure in the tank in the usual manner.

A^3 represents legs for the support of the tank.

B represents the lower pipe connecting the tank and the generator.

B′ represents the upper connecting pipe between tank and generator.

Pipe B is for supplying gasolene from the tank to the generator, pipe B′ is for passing the vapor from the generator back into the tank above the gasolene level therein, constituting the governing pressure of the system. The present invention is not concerned with this feature.

C represents the generator.

C′ represents the wicking, suspended within the generator, (see Fig. 4).

D represents the sub-flame burner surrounding the generator, (see Figs. 4, 6 and 7). It is preferably constructed of two detachably horizontal sections, so that they can be readily taken apart for cleaning the ignition orifices. In order that this sub-flame burner may be used for the initial, as well as for the service heating, it is provided with an extension D^2, (see Figs. 5 and 6).

E′, and 1, represent branch pipes from service pipe E to sub-burner D, see Fig. 1, and they constitute the main sub-burner vapor supply pipe for the final generation.

F represents the supplemental sub-burner vapor supply pipe leading from the extension D^2 and connected through a valve mechanism with pipe 3, receiving vapor direct from the generator for the initial heating.

The following are the devices for controlling the initial heating. For convenience of illustration, I have shown the supply of vapor from the tank for initial heating, in the following manner:—3 represents a pipe threaded into the boss *d* at the bottom, and into the boss 4 of the governor G at the top. 5 represents a pipe threaded into the bottom of the governor and likewise having a threaded connection with a boss *e* on the tank into which is tapped the initial supply pipe B′. 6 represents a needle valve casing for controlling the supply of vapor from the tank to the supply pipe F, which is fitted into the extension D^2, (see Fig. 6).

In order that the vapor supplied to the pipe for initial heating may be in proper condition for burning, I provide means for mixing air with such vapor before it arrives at its burner, and this is accomplished as follows:—7 represents the stem of a needle valve for regulating the supply of vapor to pipe F, (see Fig. 2). 8 represents the port in boss *d* tapped by the pipe 3, out-

side of the valve seat. 9 represents the point of the valve stem. 10 represents an air mixing chamber. 11 represents a stuffing-box nut for preventing the escape of gas. It is desirable, to entrain more or less air with the vapor into pipe F. The quality of the vapor issued from the tank varies according to the temperature and gravity of the gasolene vaporized.

As it is desirable to have a blue flame for the initial heating of the generator, it is necessary to have a proper amount of air mixed with such vapor before it reaches the burner. This is accomplished by the following devices:—12 represents a valve plug controlling the air inlet port 13 of the mixing chamber 10, at the base of the supply pipe F, (see Fig. 2). 15 represents the valve lever pivoted to the bracket 16, and its outer end engaging a cam-way 17 of a valve controlling disk handle 18, fixed to the needle valve stem. The rotation of this disk opens or closes the needle valve port. The operation of this cam and lever is such, that when the needle valve is opened the air valve is also opened. They will continue to open simultaneously in direct ratio, as the needle valve is opened, say until the needle valve is half opened. The air valve will then commence to close, and will be completely closed when the needle valve is fully opened. This arrangement is for the reason that sometimes it is desirable to have the needle valve fully open, with no air supplied, for instance, with some very poor vapor.

As the same burner is employed for both the initial heating and the main generating, it is desirable and highly advantageous to automatically close the pipe 1 leading from the service pipe to supply gas to the sub-flame burner, by the operation of the needle valve which controls the supply of gas, leading from the generator C to the service pipe E. To accomplish this, I provide the following instrumentalities:—19 represents the needle valve tapping the mixer 21, below the service pipe E. Said valve is controlled by the lever 22, fixed to the stem 20 of the needle valve 19, (see Figs. 4 and 5). 24 represents a supporting post fixed to the needle valve casing. 25 represents a rigid arm fixed thereto. This arm is mounted on a support 26 adjustably mounted upon the stem 20 of the needle valve. The free end of the said arm projects forward of the generator and supports the disk 28, affixed to the valve stem 29, carrying the valve 30^a, (see Fig. 5,) located within the extension D^2 of the burner and covering or uncovering the mouth of the gas supply pipe 1. It will be seen, as shown in Fig. 5, that when the needle valve 19 is closed the supply pipe 1 is closed, and it is automatically opened with the turning of the needle valve stem 20. It will also thus be seen that when the needle valve is closed the apparatus is in condition for initial heating and the gas supplied to the burner for this purpose cannot escape by pipe 1 into the service pipe E, and when the initial supply needle valve 12 is closed and the needle valve 20 is opened for generating gas to supply the service pipe, no gas can escape through the initial supply pipe F. I am thus enabled to use the same burner for the initial and for the service heating.

In order to improve the operation of the burner, so as to quickly heat the generator and also to maintain generation with a minimum amount of gas, it is necessary to concentrate the flame from the burner, in a zone close around the generator. In order to maintain this concentrated flame zone, I construct the burner, as shown in Figs. 6 and 7. *a* represents a series of slits or orifices, preferably extended in both sides of the burner, (see Fig. 4), and upon each side of these slits, I provide air passages *b* which extend down to the lower disk of the burner. These air passages are shown of escalloped form, and it will be seen, that these air entrances are outside of a circular line drawn abreast of the orifice *a* of the burner. The form of these air orifices is not material, provided they are radially outside of the vapor orifices *a* and are sufficiently large to supply the necessary amount of air to the gas at the point of ignition to maintain active combustion. The ignition orifices are arranged to discharge their currents of vapor substantially at right angles against the surface of the generator to be heated, so that the cone of each flame jet impinges perpendicularly against the generator surface. Also the air supply channels formed by the cut-out portions between the ignition orifices extend parallel with the generator surface, or transverse to the currents of vapor from the ignition orifices, maintaining complete combustion at that point.

If a plain annular burner were employed with vapor orifices arranged with their axes perpendicular to the generator, in order to admit sufficient air between the generator and burner to support combustion the orifices would have to be set so far back from the generator that the cones of the flame jets would not directly impinge on the generator surface, and hence much heating efficiency would be lost. With my improvement the inner wall of the burner is escalloped out between the vapor orifices so that the latter may be brought close to the generator, while the intermediate channels formed by the escalloped portions of the inner wall extend parallel with the generator surface and admit air from under the burner to the vapor orifices in quantity sufficient to maintain perfect combustion with the flame jets impinging directly upon the generator surface. By this means a steady and perfect combustion is maintained, the highest efficiency of the heat is conserved directly on the generator surface, and a quick generation of vapor is effected.

I have found by experience that with this form of burner construction, I have been able to initially heat the generator in at least one fourth of the time required by the ordinary appliances for initial heating. I have also found by experience that the heat of generation may be maintained with a very much reduced quantity of gas, when the flame is thus concentrated close around and upon the shell of the generator. I have provided an improved form of governor for shutting off the supply of gas to the generator, when the pressure has become excessive. The construction of this governor and connections is shown in Figs. 9, 10 and 11, and being connected to the generator, preferably as shown in Fig. 1. H represents the shell of the governor. I represents a metallic disk or diaphragm clamped between the shell H and the base I′, by means of the clamping ring 12. J represents a coil spring, which is compressed around the tripping stem 30 and seated between the disk 31 and the screw cap 32, which regulates the tension of the spring. The movement of stem 30 upwardly operates a valve in the extension pipe E′

and closes sub-flame supply pipe 1. In the extension of pipe E′ shown in Fig. 11, is located a valve 33, having a lever arm 34 mounted upon a shaft 35, which is journaled near the extreme end of pipe E′. Said lever 34 is provided with a sleeve 36, and through which the shaft 35 is passed and secured to the sleeve. Said shaft preferably has a bent arm 37 projected between the nut 38 and disk 39, mounted on the tripping stem 30, (see Fig. 11). Pipe 3 is connected with the port 8, and thence through the governor below the diaphragm with pipe 5, which supplies the same pressure to the governor disk as is maintained or produced in the tank. When the pressure is sufficient to compress the spring and overcome the tension of the diaphragm, so as to raise the tripping stem, the valve 33 is closed and the supply of gas to the burner is cut off, extinguishing the flame of the generator and preventing the further generation of pressure. In order to prevent the diaphragm from pulling out under excessive pressure, I have provided the circular head 40 on the cap I, and form a corresponding circular groove near the outer periphery of the diaphragm, which seats in the corresponding groove in the base I′, so as to prevent the diaphragm from being pulled out of its seat. When very hard metal is employed it is preferable to anneal the outer periphery of the diaphragm, so that the groove may be formed without undue straining of the metal.

As shown, the supply of vapor from the tank for initial heating, is from pipe 5 into the space *c* under the diaphragm of the governor and thence by port 8 into mixing chamber 10.

The form shown is one of mere convenience of construction.

It is important for a very quick generation of vapor to concentrate the flame upon the top portion of the generator, and by the top portion I mean that portion of the generator corresponding with the top portion or the level of the liquid hydro-carbon therein. Only one burner is used serving for both the initial and permanent combustion and generation, and it is located adjacent to that top part of the generator which gives the quickest generation of vapor with a given degree of heat.

Having described my invention, I claim:—

1. In combination with a gas generator of the class described, an annular burner surrounding said generator and provided with an annular series of gas orifices, an alternate series of air ports arranged between the gas orifices adjacent to and radially outside of said gas orifices, substantially as described.

2. In combination with a gas generator of the class described, an annular burner surrounding said generator and provided with an annular series of gas orifices, and an alternate series of air ports adjacent thereto, a supply chamber formed integral with the burner, and two vapor and gas supply pipes, each having separate pipe connection with two separate sources of vapor and gas supply, and valve mechanism provided for each of said separate supply connections, substantially as described.

3. In combination with a generator of the class described, an annular burner surrounding the same and provided with a series of gas orifices, and an alternate series of air ports or openings, a radial extension of said burner forming a vapor supply chamber, and a vapor supply pipe communicating with said supply chamber, substantially as described.

4. In combination with a generator, a burner the wall of which adjacent to the generator is provided with vapor orifices, the said wall being scalloped out intermediate of said orifices to form vertical air supply passages parallel with the sides of the generator, substantially as described.

5. In combination with a gasolene vapor generator, an adjacent sub-burner, having ignition orifices, arranged to discharge their vapor currents at an angle to the exposed generator surface, the burner having vertical, open air channels formed intermediate of the ignition orifices and extending substantially parallel to the side of the generator, substantially as described.

6. In combination with a gasolene vapor generator, a sub-burner arranged adjacent to and in parallel line with the surface of the generator to be heated, ignition orifices formed so as to discharge vapor substantially at right angles to the generator surface, the burner intermediate the said orifices being cut out to form vertical, open air channels extending substantially transversely to the vapor currents from the ignition orifices, substantially as described.

7. In combination with a gasolene vapor generator, a sub-burner arranged adjacent to and in parallel line with the surface of the generator to be heated, ignition orifices, arranged to discharge their vapor currents substantially at right angles to the generator, and transverse air channels intermediate of said orifices, the said burner being formed of two sections, separable on a line intersecting all of said burner orifices, substantially as described.

8. In a machine of the class described, a tank, and generator having bottom communication, a sub-burner for the generator, vapor communication from the top of the tank to the burner, a needle valve and an air valve in the said communication, whereby vapor and entrained air may be delivered to the burner, connections between the air and needle valves, whereby the air valve is opened simultaneously with the needle valve to a predetermined point and reclosed as the needle valve is further opened, and means for supplying air pressure within the tank, substantially as described.

9. In combination with a gasolene vapor generator, a surrounding annular sub-burner having ignition orifices, arranged to discharge their vapor currents at substantially right angles to the exposed generator surface, the burner having air channels formed intermediate of the ignition orifices and substantially transversely to the direction of discharge of said vapor currents, said air channels annularly surrounding the generator in a circle outside of the circle of ignition orifices, substantially as described.

10. In a machine of the class described, a tank and generator having bottom communication, a sub-burner for the generator, vapor communication from the top of the tank to the burner, a needle valve and an air valve in the said communication whereby vapor and entrained air may be delivered to the burner, connections between the air and needle valves, whereby the air valve is opened simultaneously with the needle valve to a predetermined point, reclosed as the needle valve is further opened, and again reopened and closed as the needle valve is moved from its fully opened to its fully closed position, substantially as described.

In testimony whereof, I have hereunto set my hand.

JOSEPH STUBBERS.

Witnesses:
OLIVER B. KAISER,
LEO O'DONNELL.