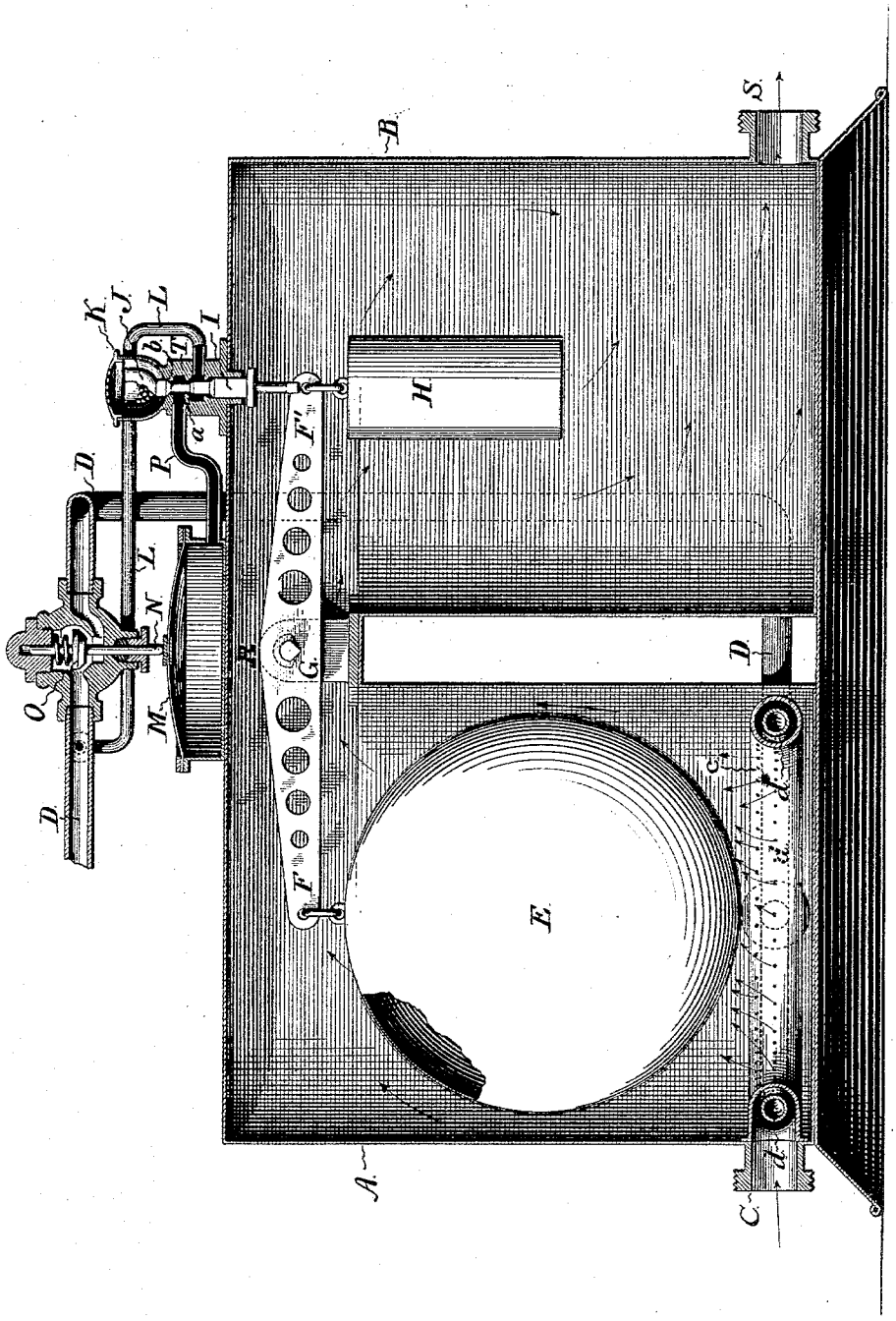
(No Model.)

E. J. FROST.

DEVICE FOR REGULATING THE QUALITY OF CARBURETED VAPOR OR GAS.

No. 381,619. Patented Apr. 24, 1888.



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UNITED STATES PATENT OFFICE.

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DEVICE FOR REGULATING THE QUALITY OF CARBURETED VAPOR OR GAS.

SPECIFICATION forming part of Letters Patent No. 381,619, dated April 24, 1888.

Application filed August 1, 1887. Serial No. 245,774. (No model.)

To all whom it may concern:

Be it known that I, EDWARD J. FROST, of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Devices for Regulating the Quality of Carbureted Vapor or Gas, whereof the following is a specification, reference being had to the accompanying drawing, which represents a vertical central section through the apparatus.

The object of my invention is to overcome the well-known difficulty which attends the use of carbureters for making illuminating-vapor, and which is due to the fact that the saturation of the air-current varies greatly, so that the flame thereof is at times smoky from excess of hydrocarbon. I have found that a very sensible increase of weight attends such over-saturation of the current, and hence have utilized this feature for automatically controlling a dilution of the main current by a secondary air-blast, admitted thereto after the current has been charged with hydrocarbon vapor.

In the accompanying drawing, A and B represent two cylindrical closed vessels mounted upon a suitable base and communicating with each other at top by a horizontal passage, R. An annular perforated pipe, *c*, extends around the lower portion of the vessel A, and is provided with an external coupling, C, to which the exit-pipe of the carbureter (not shown) is to be attached. The carbureter may be of any of the well-known types; but I prefer to use the device specified in my Letters Patent No. 278,529, dated May 29, 1883. Within the annular pipe *c* is a smaller perforated pipe, *d*, communicating with an exterior air-blast pipe, D. This pipe D is in communication with the main air-blast supply of the carbureter, and is provided with a normally-closed puppet-valve, O, whose stem N rests upon the surface of a flexible diaphragm or aneroid, M, mounted upon the top of the passage R, but isolated from the interior thereof. A pipe, L, leads from the pipe D (at a point not under the control of valve O) to a valve-chamber, T, mounted upon the top of the vessel B. From this valve-chamber T (whose valves will presently be described) a pipe, P, leads to the interior of the space beneath the diaphragm M.

Upon suitable supports, G, within the passage R, I mount a balance-beam, F F′, carrying upon the arm F, which is within the vessel A, a float, E, preferably an air-tight globe of thin copper or other metal, and upon the other arm, F′, a counter-weight, H, and a vertical valve-stem, I, which extends through the top of the vessel B and into the chamber T. This stem I is provided with two puppet-valves, *a* and *b*, facing in opposite directions within said chamber, and so arranged that when one is upon its seat the other is open. When the valve *a* is open, communication is established between the pipes L and P, and consequently the full pressure of the air-blast in the pipe D is transmitted to the under side of the diaphragm M. When, however, the valve *a* is closed, the valve *b* is open and the pipe P then communicates with the enlarged upper portion, K, of the chamber T, which is open to the outside air. The stem I terminates in a cup, J, in which shot, &c., may be placed to obtain a counter-balance of the utmost nicety.

At the bottom of the vessel B is a coupling-pipe, S, which leads to the burners.

The operation of the device is as follows: The normal quality of vapor having been determined, the counter-weight upon the arm F′ is so adjusted that when the vapor is passing through the vessels A and B on its way to the burners the weight of the globe E shall just suffice to hold the valve *a* up against its seat. If, however, the vapor-current becomes too highly saturated, the increase of density floats the globe E upward, and by depressing the arm F′ opens the valve *a*. This admits the air-current from pipe D beneath the diaphragm M and distends it, raising the stem N and opening the valve O. The air-current then passes down through the continuation of the pipe D and enters the annular pipe *d*, issuing through the perforations thereof and mingling with the arriving vapor-current in the annular pipe *c*, so as to dilute it. The consequent reduction of density causes the globe E to sink, and when the normal point has been reached its descent closes the valve *a*, opening at the same time the valve *b*, which permits the escape of the air under pressure from beneath the diaphragm M. This diaphragm then falls and permits the valve O to

close, cutting off the diluting air-current. As these movements are gradual and the balance of great delicacy, the automatic regulation of quality is very minute and effectual.

Having thus described my invention, I claim, in a regulating device for carburetors having the usual air-supply, the following combinations of parts interposed between the carburetor and the burners:

1. The combination of an inclosing receptacle into which both the vapor-pipe and air-blast pipe lead, a balance-beam, a float mounted upon one arm thereof, a valve-operating device actuated by the other arm thereof, and a valve operated by said device and controlling the said air-blast pipe, substantially as set forth.

2. The combination of the vessels A and B, communicating as described, the balance-beam and float arranged therein, the perforated pipes *c* and *d*, the former communicating with the vapor-pipe, the latter communicating with the air-blast pipe, the double valve *a b*, actuated by the balance-beam, the aneroid whose inlet and outlet are controlled by said double valve, as described, and the valve O, actuated by said aneroid and controlling the air-inlet of the pipe *d*, substantially as set forth.

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Witnesses:
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