(No Model.)

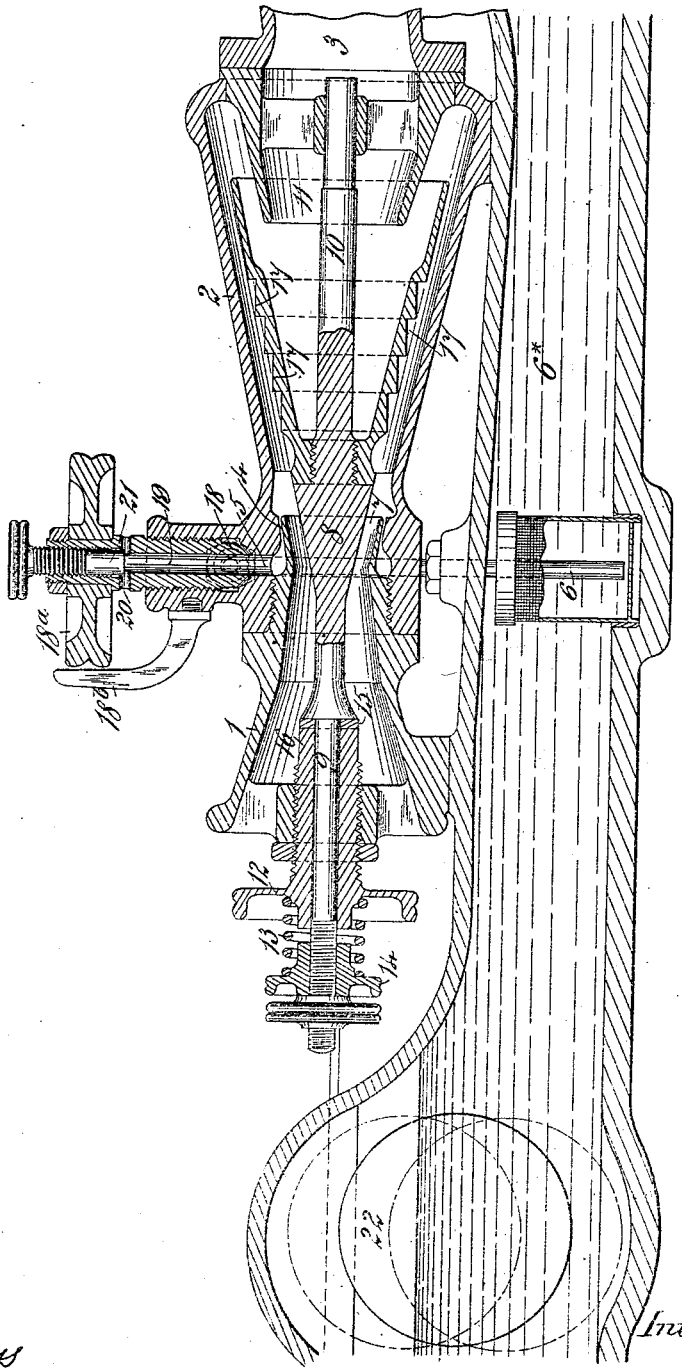
2 Sheets—Sheet 1.

E. BUTLER.

HYDROCARBON MOTOR.

No. 423,214. Patented Mar. 11, 1890.

Fig. 1.



Witnesses.
W. Cross
W. Frost

Inventor.
Edward Butler

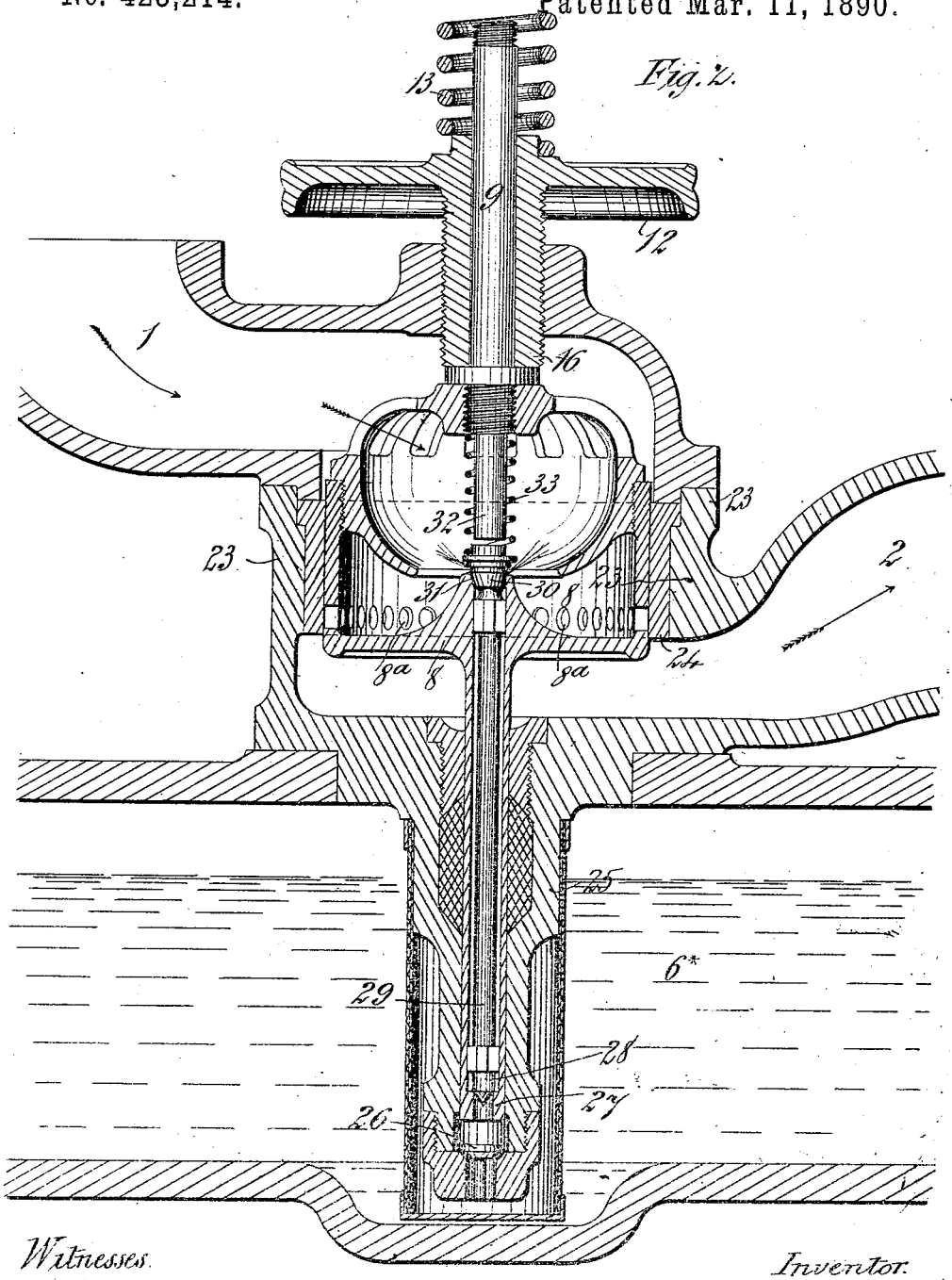
(No Model.) 2 Sheets—Sheet 2.

E. BUTLER.

HYDROCARBON MOTOR.

No. 423,214. Patented Mar. 11, 1890.

Fig. 2.



Witnesses.
W. Cross.
Wm. A. Frost.

Inventor.
Edward Butler,

UNITED STATES PATENT OFFICE.

EDWARD BUTLER, OF LONDON, ENGLAND, ASSIGNOR TO THE BUTLER'S PATENT PETROL-CYCLE SYNDICATE, (LIMITED,) OF SAME PLACE.

HYDROCARBON-MOTOR.

SPECIFICATION forming part of Letters Patent No. 423,214, dated March 11, 1890.

Application filed June 8, 1889. Serial No. 313,539. (No model.) Patented in England November 15, 1887, No. 15,598.

To all whom it may concern:

Be it known that I, EDWARD BUTLER, engineer, a subject of the Queen of Great Britain and Ireland, residing at 55 Old Broad Street, in the city of London, England, have invented Improvements in Carbureting Devices or Inspirators for Hydrocarbon-Motors, (for which I have obtained Letters Patent in Great Britain, November 15, 1887, No. 15,598,) of which the following is a specification.

This invention relates to improvements in carbureting devices or inspirators for producing an intimate mixture of air and petroleum-spray for use in petroleum-motors.

In a carbureting device or inspirator (hereinafter called an "inspirator") according to this invention the quantity of petroleum sprayed into the air on its way to the motor-cylinder is varied according to the quantity of air drawn through the inspirator at each suction-stroke of the motor-piston, so that the degree of carburation of the air so supplied to the motor shall remain practically constant.

In the accompanying two sheets of drawings, Figure 1 is a central longitudinal section of an inspirator constructed according to this invention with part of an attached reservoir. Fig. 2 is a similar view to Fig. 1, illustrating a modified form of inspirator.

The inspirator shown in Fig. 1 comprises two conoidal-shaped casings 1 and 2, secured together at their smaller ends, as shown. The larger end of the casing 1 is in communication with the atmosphere, and the larger end of the casing 2 is adapted to be connected by a pipe 3 with the working-cylinder of the motor with which the inspirator is to be used. The smaller end of the casing 1 projects into the smaller end of the casing 2, and is so arranged with reference thereto as to leave an annular space 4 between the two, as shown, the outlet of which may consist of a series of holes. Leading into this annular space is a passage 5, through which petroleum is induced to flow through a tube 6 from a petroleum-reservoir 6* by the inducing action of a current of air drawn in at the larger end of the casing 1 and caused to flow through the nozzle or smaller end thereof at each exhaust-stroke of the motor-piston.

Within the casing, and extending centrally through the nozzle 7, so as to form an annular airway, is a conoidal-shaped plug 8, provided with stems 9 10, that can slide longitudinally in bearings formed in a conoidal-shaped casing 11 and a nut 12, respectively.

13 is a spring that bears at one end against the nut 12 and at the other end against an adjustable nut 14 on the stem 9, and normally keeps a shoulder 15 on the plug against the inner end of the extension 16 of the nut 12. The right-hand end of the plug may advantageously be stepped, as at 17, in order that the air and petroleum-spray flowing between it and the casing 2 may be intimately mixed. For the same reason the plug may advantageously be made hollow and the casing 11 be arranged to project therein, as shown.

The flow of petroleum through the annular opening 4, due to the inducing action of air flowing through the nozzle 7, may be regulated by means of an adjustable conically-formed valve 18, that is provided with a hand-wheel 18^a.

18^b is a pointer or index-finger for indicating, in connection with a scale on the hand-wheel, the position of the valve 18. This valve may be provided with a hole 19, as shown, for the passage of air which can enter through holes 20 and mix with the petroleum as it passes the end of the valve 18 and causes it to flow into and around the annular space 4 in the form of spray. The petroleum or petroleum-spray is drawn by the current of air flowing through the nozzle 7 into the enlarged space within the casing 2, where there subsists a partial vacuum, and in which the air becomes intimately incorporated with the petroleum or partially-vaporized petroleum-spray.

21 is a screw-plug for controlling the flow of air through the holes 20.

The petroleum is maintained at a constant height in the reservoir 6* by any suitable means, such as a valve controlled by a float 22.

By mounting the plug in the manner described the greater the exhausting action of the motor the more it will move to the right against the action of the spring 13 and enlarge the annular opening 7 to allow of the

passage of a greater quantity of air therethrough, and vice versa. The quantity of petroleum induced to flow through the annular passage 4 will also vary with the quantity of air passing through the nozzle or annular opening 7, so that the carburation of such air will remain practically constant. The air thus carbureted is drawn off through the pipe 3 to the motor-cylinder.

The extent of movement of the plug 8 by the action of the inflowing air may be regulated by adjusting the action of the spring by the nut 14.

The inspirator illustrated in Fig. 2 comprises a casing 23, through which air is drawn in the direction of the arrows by the inducing action of the piston of the motor. In this casing is fitted to slide vertically a cylindrical plug or piston-valve 8, that is formed with a series of openings 8^a, that can be brought below or raised above the lower edge 24 of the inner cylindrical portion of the casing by the downward or by the upward movement (as the case may be) of the piston-valve. The space above the piston-valve is in constant and free communication with the atmosphere by the branch 1, and the space below the valve communicates by the branch 2 with a motor-cylinder.

The pressure of the air upon the top of the piston-valve when a partial vacuum is formed below the same by the suction or down stroke of the motor-piston tends to force down the piston-valve. This downward tendency of the piston-valve is opposed by the upward pressure of the adjustable spring 13, as in Fig. 1.

The casing 23 is provided with a tubular extension 25, which dips into a petroleum-reservoir 6* and is furnished with an inlet-valve 26. In this tubular extension works a tubular plunger 27, that projects from the under side of the piston-valve. This tubular plunger is open at both ends, and in its lower end is provided a seat for a valve 28, that opens upward and is rigidly connected by a stem 29 with another valve 30, that also opens upward and is capable of closing upon a seat at 31. When the piston-valve and tubular plunger move upward, the inlet-valve 26 will open and admit a quantity of petroleum to the interior of the tubular extension, and when the piston-valve and plunger are caused to move downward the petroleum will be forced to ascend within the plunger and issue at its upper end in the form of a thin annular stream of spray produced by the conical formation of the upper valve 30. This spray mingles with and carburets the inrushing air, which then passes through the openings 8^a, which will then be brought below the edge 24 by the downward movement of the piston-valve. The mingling of the air with the petroleum-spray is promoted by the concave spherical formation of the inner surface of the upper part of the piston-valve.

32 is a stop to limit the upward movement of the valve 30, which is normally pressed upon its seat by a spring 33.

The travel and action of the piston-valve may be adjusted by means of the nut 12, spring 13, and a nut on the valve-stem 9, similar to the nut 14, Fig. 1. At each suction-stroke of the motor-piston the piston-valve will be caused to descend to allow air to flow through the holes 8^a. The extent of motion thus imparted to the piston-valve varies with the quantity of air supplied to the motor-cylinders. The quantity of petroleum sprayed into the valve-casing will also at the same time be correspondingly increased or diminished according to the said quantity of air drawn in at each stroke of the motor-piston. By this means the degree of carburation of the air supplied to the motor remains practically constant.

What I claim is—

1. A carbureting device or inspirator adapted to be connected with the cylinder of a hydrocarbon-motor and comprising a casing having inlets for air and for petroleum and an outlet for carbureted air, and an air-regulating device adapted to be operated in an automatic manner by air drawn through said casing on the suction-stroke of said motor, the arrangement being such that when air is drawn through said casing at each inspiration-stroke of the motor petroleum will be caused to enter said casing and mingle with said air, the proportion of petroleum so admitted varying with the proportion of air passing through the said casing.

2. In a carbureting device or inspirator for hydrocarbon-motors, the combination of a casing having a contracted air-passage, a chamber or passage for petroleum, an inlet-pipe arranged to admit petroleum to said chamber or passage, and a plug or spindle arranged within and capable of automatically adjusting its position within said contracted air-passage, substantially as herein described.

3. In a carbureting device or inspirator for hydrocarbon-motors, the combination of a casing having an air-passage therethrough contracted at one part, an annular chamber or passage surrounding said contracted part, and an inlet-pipe arranged to deliver petroleum to said chamber or passage, substantially as herein described.

4. In a carbureting device or inspirator for hydrocarbon-motors, the combination of a casing having a contracted annular air-passage therethrough, an annular petroleum chamber or passage surrounding said air-passage for petroleum, an inlet-pipe arranged to admit petroleum to said chamber or passage, and a conical plug or spindle arranged within said contracted air-passage and capable of longitudinal movement, substantially as herein described, for the purpose set forth.

5. In a carbureting device or inspirator for hydrocarbon-motors, the combination of a casing having a contracted annular air-pas-

sage therethrough, an annular chamber or passage 4 for petroleum, an inlet-pipe 6, arranged to admit petroleum to said annular chamber or passage, and a regulating-valve 18, capable of controlling the flow of petroleum through said pipe, substantially as herein described.

6. In a carbureting device or inspirator for hydrocarbon-motors, the combination of a casing having a contracted air-passage, a chamber or passage for petroleum, an inlet-pipe arranged to admit petroleum to said chamber or passage, and a pipe or passage arranged to deliver air to petroleum passing through and before it leaves the said chamber or passage, substantially as herein described, for the purpose specified.

7. A carbureting device or inspirator comprising two conical or conoidal shaped casings arranged with their smaller ends adjacent and through which air can pass, an annular chamber surrounding the contracted part of the passage through said casings, and a pipe adapted to supply petroleum to said annular chamber, substantially as herein described, for the purpose specified.

8. A carbureting device or inspirator comprising two conical or conoidal shaped casings arranged with their smaller ends adjacent and through which air can pass, an annular chamber surrounding the contracted part of the passage through said casings, a pipe adapted to supply petroleum to said annular chamber, and a spindle arranged within the air-passage through said casings and adapted to vary the cross-sectional area of said passage, substantially as herein described, for the purpose set forth.

9. A carbureting device or inspirator comprising a double conical casing 1 2, an annular passage 4, surrounding the contracted passage through said casing, a pipe 6, for admitting petroleum to said annular passage, a valve 18, for controlling the passage of petroleum through said pipe to said annular passage and having an airway therethrough, and an automatically-adjustable plug or spindle 8, arranged longitudinally within said casing, substantially as herein described, for the purposes set forth.

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

EDWARD BUTLER.

Witnesses:
WILLIAM CROSS,
EDW. W. OCKENDEN,
Both of 46 *Lincoln's Inn Fields, London, W. C.*