March 23, 1926.

1,577,704

E. R. FLEMING

VAPORIZER AND SEPARATOR

Filed March 11, 1925 2 Sheets-Sheet 1

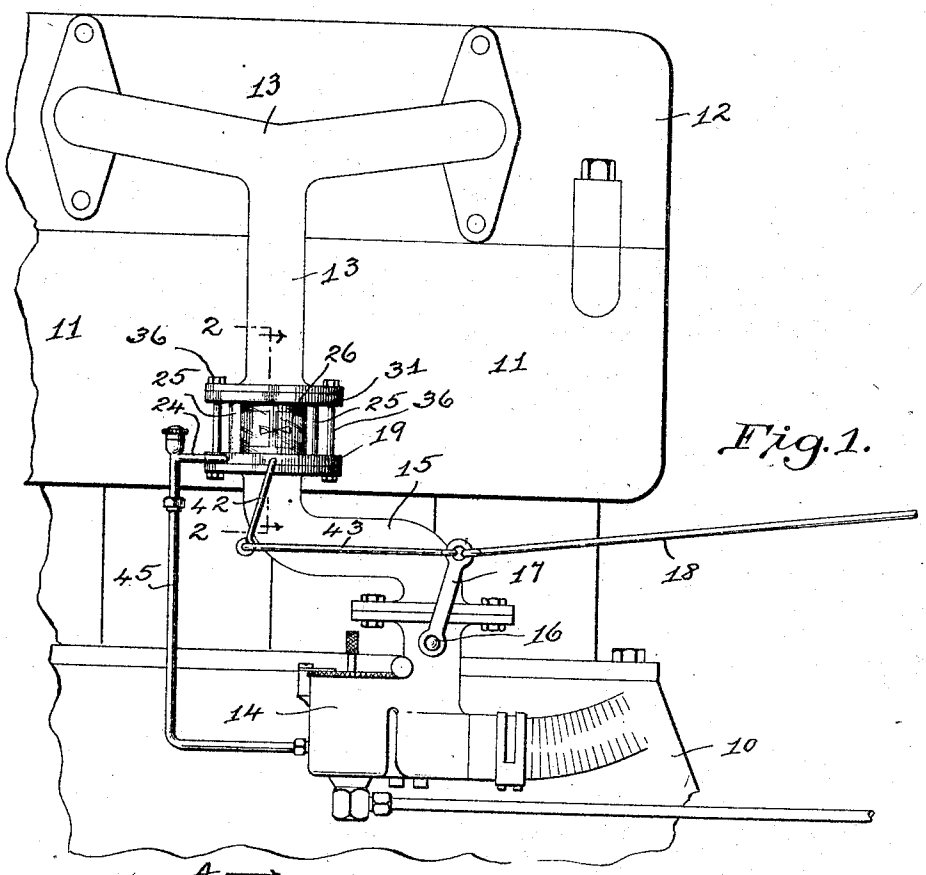

Fig. 1.

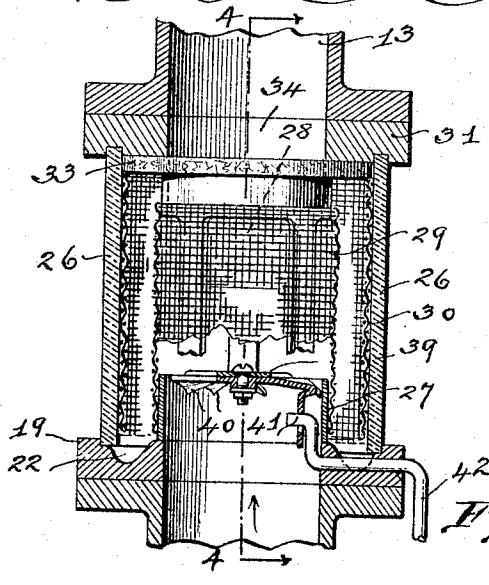

Fig. 2.

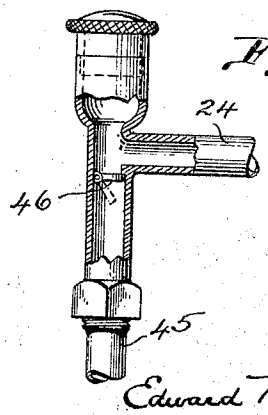

Fig. 3.

Inventor

Edward R. Fleming

By Charles B. Mann Jr.,

Attorney,

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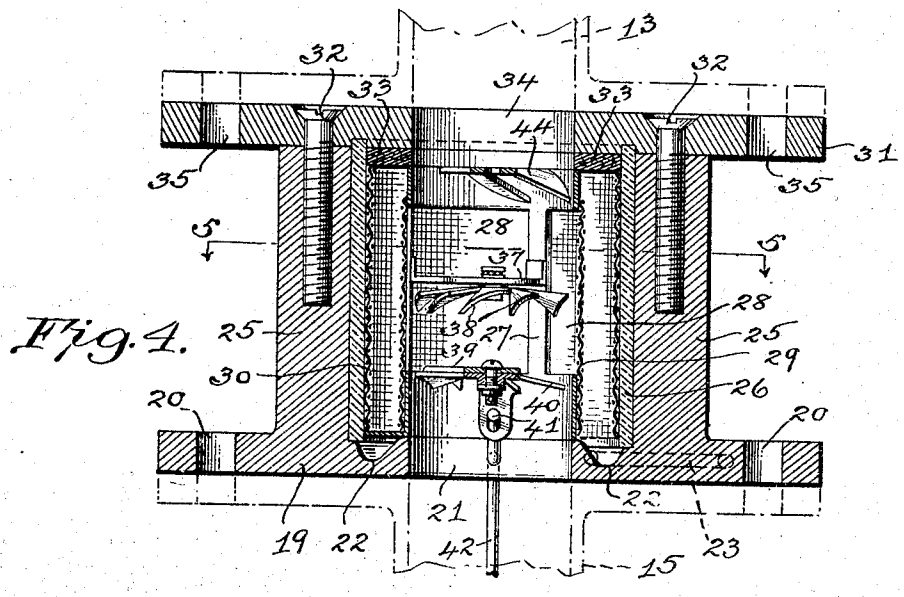


Fig. 4.

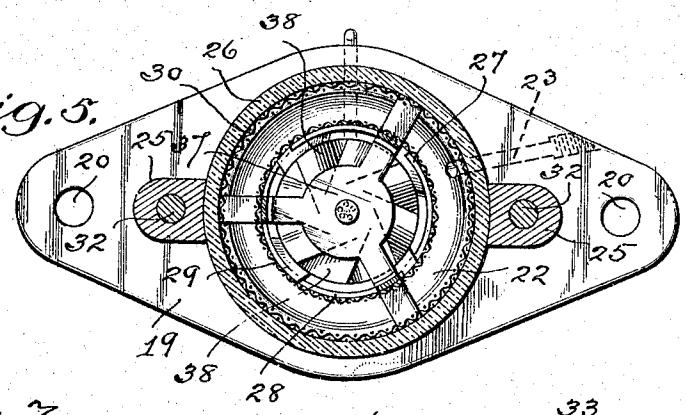
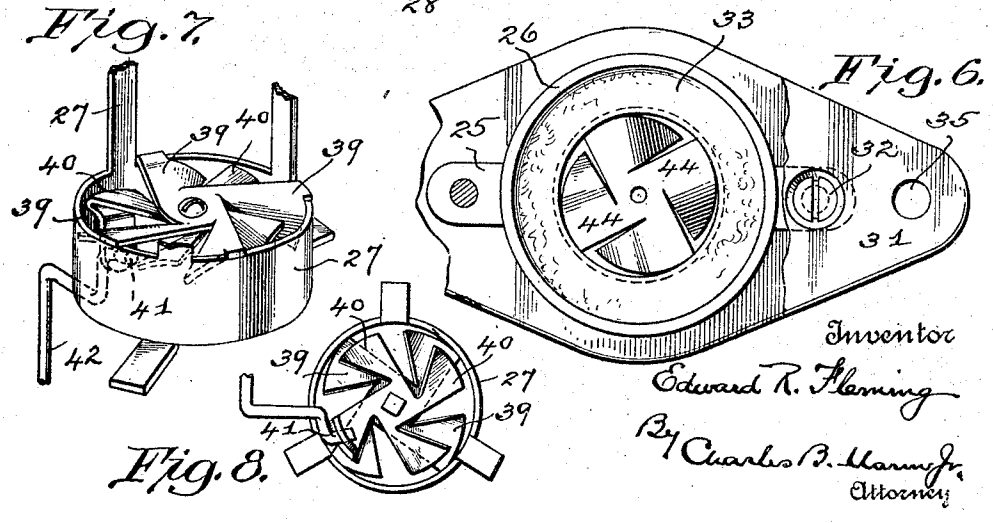


Fig. 5.



Inventor
Edward R. Fleming
By Charles B. Mann Jr.
Attorney

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UNITED STATES PATENT OFFICE.

EDWARD R. FLEMING, OF BALTIMORE, MARYLAND.

VAPORIZER AND SEPARATOR.

Application filed March 11, 1925. Serial No. 14,761.

To all whom it may concern:

Be it known that EDWARD R. FLEMING, a citizen of the United States, residing at Baltimore, in the State of Maryland, has invented certain new and useful Improvements in Vaporizers and Separators, of which the following is a specification.

This invention relates to a vaporizer and separator for internal combustion engines and has for its object to provide a separator which shall be independent of the carbureter and interposed between the carbureter and the intake of the engine whereby the charge after leaving the carbureter will be broken up and screened with a view of effecting a better mixture of air and gas and at the same time extracting condensed particles of liquid such as raw gas or water so that a more perfect gas charge will enter the engine itself.

The invention is illustrated in the accompanying drawings, wherein,—

Fig. 1. shows a portion of an engine and its carbureter with my improved device attached in the intake manifold between the carbureter and engine.

Fig. 2. illustrates an enlarged vertical section through the improved separator as the same would appear if cut on the line 2—2 of Fig. 1.

Fig. 3. shows an enlarged sectional elevation through the off-take or drain connection.

Fig. 4. illustrates an enlarged cross-sectional detail through the separator,—the section being taken on the line 4—4 of Fig. 2.

Fig. 5. shows a horizontal sectional detail through the separator,—the section being taken on the line 5—5 of Fig. 4.

Fig. 6. illustrates the separator in top view with the top-flange plate removed.

Fig. 7. shows the lower portion of the cylindrical frame and the damper therein, in perspective, and

Fig. 8. illustrates the same in inverted or bottom view.

Referring to the drawings the numeral 10, designates the base of an internal combustion engine on which the blocks 11 containing the cylinders are mounted, and 12 designates the head to which the intake manifold 13, is connected so as to deliver the charge through the head to the cylinders in the usual manner.

The carbureter 14, of any desired make or style is shown attached to the base with a conduit 15, leading therefrom toward the intake manifold so as to convey the usual charge of gas and air.

Between the carbureter 14 and the head 12, I locate my improved separator device,—the preferred way of attaching it being to interrupt the intake manifold pipe or conduit and place the separator at the interrupted point so that the charge of gas and air will pass from the carbureter through the separator and then to the engine.

In the present instance I prefer to locate the throttle-valve stem 16 on the outer end of which there is the usual lever 17, so that an actuating rod 18, when moved by the driver will open or close the throttle-valve as desired.

From the foregoing explanation it is to be clearly understood that the improved separator is in no sense a carbureter; is no part of the carbureter but receives the charge on its way from the carbureter to the engine.

In the present form of separator the same has a lower flanged plate 19 with bolt-holes 20 at opposite ends thereof and with a central aperture 21, which registers with the passage of the conduit 15. The upper side of this plate is provided with an annular drain-groove or channel 22, around the aperture and a passage 23, extends through the plate and is connected by a drain-tube 24 on the exterior, for purposes presently to be explained.

At opposite sides of the drain-groove or channel 22 the plate 19 has vertically-extending posts 25 which serve a useful purpose as will presently appear.

A tube 26 seats on top of the plate 19 around the drain-groove 22 and this tube extends vertically between the two posts.

At the center of the tube 26 I locate a cylindrical frame 27 whose lower end seats on the upper side of the plate 19 around the central aperture 21 and said frame extends vertically in the tube 26.

The cylindrical frame 27 has circumferential openings 28 between its upper and lower ends, and closely about the frame, and covering said openings, there is a tube 29 of fine wire mesh.

In the present form I further provide a second tube 30 of fine wire which latter has position between the wire tube 29 and the outer tube 26.

It will thus be seen that a plurality of screens are provided between the outer tube 26 and the cylindrical frame 27.

All of these tubes 26, 29 and 30 and the cylindrical frame 27 are held down in place by a top plate 31 of the separator which plate is locked in place by means of screws 32 that pass down into the posts 25.

A washer 33 is preferably placed on top of the screen 30 and also on the cylindrical frame 27 so as to seal the interior chambers. The top plate 31 also has a central aperture 34 which alines on the under side with the interior of the cylindrical frame and on its upper side communicates with the passage in the intake manifold 13.

Bolt-holes 35 are provided at opposite sides of the top-plate 31 so that the entire separator may be attached to the manifold and the conduit by two bolts 36 as shown in Fig. 1, of the drawing.

The interior of the cylindrical frame 27 is provided with a spider 37 which is rigidly held therein between the top and bottom and on the under side of this spider there is carried a head having a series of blades 38.

Near the bottom of the cylindrical frame, I provide a series of stationary blades 39 to which I rotatably mount a series of movable blades 40. These movable blades are connected to the inner end 41 of a crank lever which latter extends through and has bearing in the bottom plate 19 and the outer end 42 of this lever is connected by a rod 43 to the throttle-actuating lever 17, so that when the throttle-valve lever 17 is operated to open the throttle-valve, the rod 43 and lever 42—41 will be moved to rotate the blades 40 and increase the size of the openings up through the cylindrical frame. These blades 39 and 40 therefore serve as a damper and open when the quantity of gas is increased but close down as the quantity of gas from the carbureter is decreased.

At the top of the cylindrical frame, I provide a series of curved blades 44, which serve as a baffle to prevent the gas from passing straight through and which also keeps the gas in a whirling motion during its passage therethrough.

The drain-tube 24 from the channel 22, is connected to a tube 45, which latter in this instance leads back to the carbureter so that any liquid flowing from the separator may be carried back to the carbureter. A check valve 46 is provided in this tube 45 to prevent any interference with the intake suctions and to also prevent the liberated liquid after it passes the valve from being drawn back toward the separator.

In the operation of the device as the gas is drawn toward the intake manifold 13, it will pass up into the cylindrical frame, being given a whirling motion as it enters. As it strikes the rotating blades 38, it will be subjected to centrifugal forces and thrown laterally through the screens, during which operation the gas will be broken up. Any liquid such as an excess quantity of liquid gas will be collected on the screens from which it will flow downwardly into the groove 22 with the result that the gas will be more thoroughly mixed and the liquid removed. Such liquid as is removed will flow from groove or channel 22 through passage 23 to tubes 24 and 45 and thus be carried off.

Having described my invention, I claim,—

1. In a vaporizer for internal combustion engines that employ a carbureter and a throttle valve mechanism, the combination with a cylindrical structure through which the mixture from the carbureter passes said structure having rotary means for whirling the mixture, screen means in said structure through which the mixture is passed to separate condensed particles of liquid therefrom and means actuated by the throttle-valve mechanism for varying the size of the passage in said cylindric structure as the throttle valve is moved.

2. In a vaporizer for internal combustion engines that employ a carbureter and a throttle valve mechanism, the combination with a cylindrical structure through which the mixture from the carbureter passes said structure having a baffle means therein and also having rotary means therein to whirl the mixture, a stationary screen about the baffle and the rotary means, a damper device at the entrance to the cylindrical structure and means operated by the throttle valve mechanism for moving the damper as the throttle-valve is actuated.

3. In a vaporizer for the purpose set forth the combination with a cylindrical structure, of a plurality of concentric screens in said structure, a baffle means encircled by the screen having the smallest diameter, and a movable damper to vary the area of the passages to said screen of the smallest diameter.

4. In a vaporizer for internal combustion engines the combination with a cylindrical structure through which the mixture passes said structure being provided with an inlet and an outlet, of a cylindrical frame in the structure between said inlet and outlet, baffle devices carried by said frame near the structure outlet, means in the cylindrical frame near the inlet to vary the size of the entrance to said frame and a stationary screen in the structure closely about said frame.

5. In a vaporizer for internal combustion engines the combination with a cylindrical structure having an inlet and an outlet and through which the mixture passes, of a stationary cylindrical frame arranged centrally in said structure and having openings

in its circumference, screen means covering said frame-openings, baffles in the frame above and below the circumferential openings therein and rotating means also in the frame between said upper and lower baffles.

6. In a vaporizer for internal combustion engines the combination with a cylindrical structure having an inlet and an outlet, of a centrally arranged cylindrical frame in said structure between the said inlet and outlet said frame being provided with circumferential openings, stationary baffle-means in the frame above the said openings, movable baffle means in the frame below said openings, rotatable means sustained in the frame at said openings and a screen around the frame and covering said openings.

7. In a vaporizer for internal combustion engines the combination with a plate having posts extending vertically therefrom, of a top plate, means for securing the top plate to the posts, a cylinder clamped between said plates, a cylindrical frame also clamped between said plates said frame having openings in its circumference between said plates, a screen over said openings and rotary means sustained by the frame at said openings.

8. In a vaporizer for internal combustion engines the combination with a cylindrical structure having bottom and top plates with an inlet in the bottom and an outlet in the top, of a plurality of concentric screens in the structure between said top and bottom plates, means in the smaller screen for whirling the mixture and directing it through the said smaller screen and a passage opening into the structure at the base of the concentric screens for carrying off the separated liquid.

In testimony whereof I affix my signature.

EDWARD R. FLEMING.