L. M. KEIZER.

CARBURETER.

APPLICATION FILED APR. 12, 1912.

1,125,340.

Patented Jan. 19, 1915.

2 SHEETS—SHEET 1.

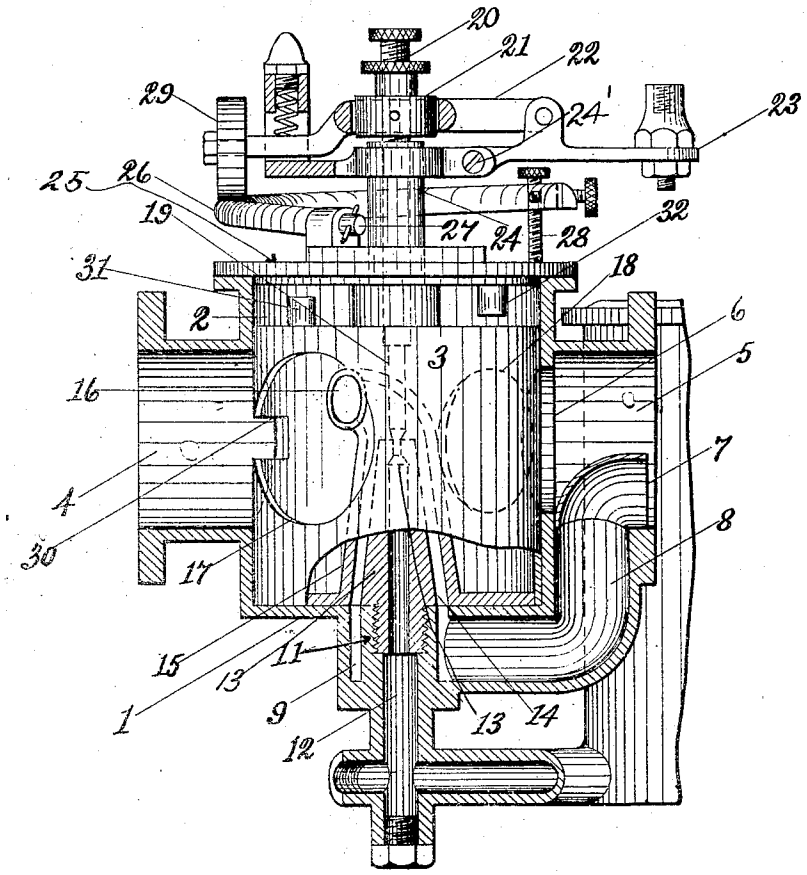


Fig. 1.

Witnesses.
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2 SHEETS—SHEET 2.

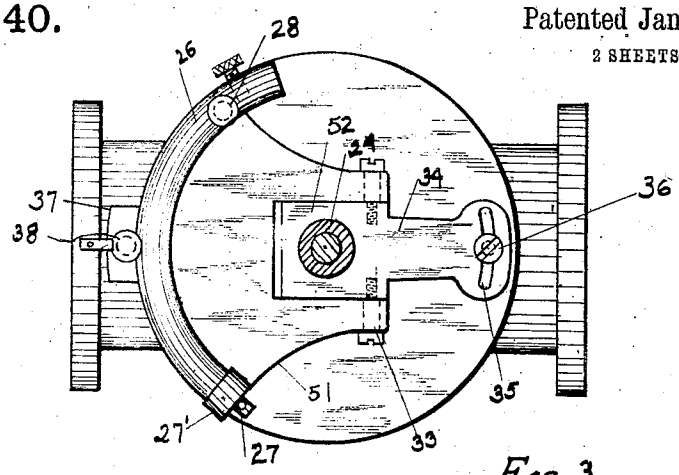


Fig. 3

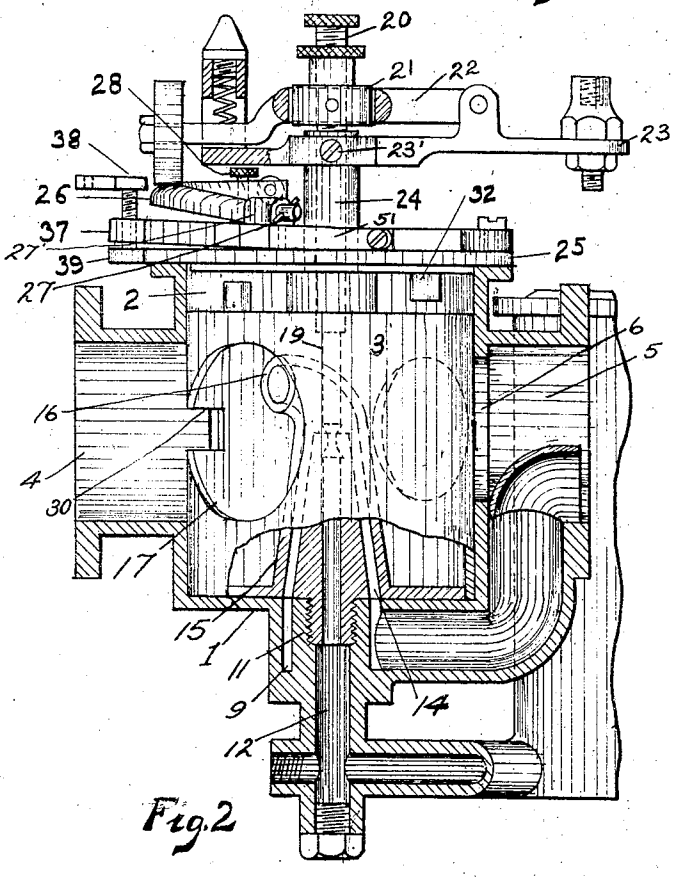


Fig. 2

Witnesses

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UNITED STATES PATENT OFFICE.

LEWIS M. KEIZER, OF BALTIMORE, MARYLAND.

CARBURETER.

1,125,340. Specification of Letters Patent. Patented Jan. 19, 1915.

Application filed April 12, 1912. Serial No. 690,409.

To all whom it may concern:

Be it known that I, LEWIS M. KEIZER, a citizen of the United States of America, residing at the city of Baltimore, State of Maryland, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

In my previous applications, Serial Nos. 610,542 and 643,361, I have described a carbureter in which there is a swinging or rotating air valve preferably in the form of a barrel valve, and a fuel nozzle discharging within the barrel valve and controlled by means of a needle valve. Means are provided for opening and closing the air valve and the fuel valve, and for the purpose of varying the relative opening of these valves, I provide a cam and a follower for the cam connected to the barrel valve to move therewith and to the fuel valve to actuate it. In the carbureter shown in these applications, the cam is adjustable, that is, it is pivoted to swing in the plane of motion of the fuel valve, and means are provided for adjusting it about its pivot to vary the throw of the fuel valve. The fuel valve is also adjustable relatively to the follower for the purpose of varying its opening at all positions of the follower. But this is in the nature of a permanent adjustment which is regulated when the carbureter is first put in operation and with the change of seasons if desired. For starting in cold weather, hill climbing, etc., I find it desirable to vary temporarily the proportion of the fuel fed to the amount of air, and to do this while the engine is running. To this end I vary the opening of the fuel valve relatively to the air valve and throttle valve. This is accomplished by adjusting the position of the cam and moving it bodily in the direction of motion of the fuel valve. For this purpose I provide a device for so moving the cam which operates quickly and conveniently and makes it unnecessary to disturb the permanent adjustment of the parts to accomplish this regulation. I also find it desirable, to change the adjustment of the parts, to provide for difference in running conditions due to change of seasons. For this purpose I vary the timing of the cam whereby the opening of the fuel valve from its minimum position takes place earlier or later as compared to the opening of the throttle, and the relative motions of the valves are also changed. To this end I provide means for conveniently swinging the cam and adjusting it angularly about the barrel valve so that its position relative to the cam follower is changed without changing the position of the barrel valve. For convenience in construction and for other reasons, I find that it is most desirable to use a flat cam, *i. e.*, a cam having its operative surface in a single plane. In ordinary usage such a cam operates successfully. However, with the carbureter constructed with circular ports, it is found that at half throttle the flow of gasolene under some conditions tends to be insufficient. By means of a lead notch in the throttle opening, I am enabled to increase the area of the mixture passage at this time. Thus the suction about the fuel nozzle is increased and the richness of the charge at half throttle is correspondingly increased. In this way the operation at mean throttle is benefited.

In the accompanying drawing I have shown carbureters embodying the various features of my invention in their preferred forms.

Figure 1 is a central vertical section of my carbureter constructed in accordance with one form of my invention. Fig. 2 is a vertical central cross-section of another form of the carbureter. Fig. 3 is a plan of the same.

The carbureter shown in Fig. 1 consists of a casing 1 having a central cylindrical chamber 2 in which is mounted a valve 3 which may be of the cylinder or barrel type. The chamber has an outlet 4 which is connected to the intake of the cylinder and an inlet 5. Preferably, these passages are of substantially the same area of cross-section throughout the greater part of their length but the inlet passage is choked at 6 adjacent the chamber reducing its area so that it is considerably less than that of the outlet passage. This is known as the secondary air inlet. The choking may be accomplished by first boring the inlet passage of a cross-sectional area equal to that of the choked portion 6 and then chambering the outer end of the passage to the area of the outlet. In the chambered portion 5 of the inlet, as shown, there is a hood 7 which leads to a passage 8 known as the primary or constant air passage which in turn leads to an annular opening 9 in the bottom of the chamber 2. A central upright 11 within the annular opening 9 is pierced vertically

by a fuel passage 12 which terminates in the mouth 13′ of the nozzle 13. The passage 12 is connected by suitable means to a fuel supply sufficient to maintain a flow of fuel through the nozzle. The bottom wall of the barrel valve 3 is apertured at 14 to register with the annular opening 9 and a cone 15 covers with its base the opening 14. This cone 15 has an aperture 16 near its apex. The barrel valve has a throttle opening 17 adapted to register with the outlet 4 and an air valve opening 18 adapted to register with the choked inlet 6. Coöperating with the nozzle 13 is a fuel or needle valve 19. This valve is mounted on a screw threaded stem 20. The fuel valve and the barrel valve may be connected to move simultaneously and their relative motions varied and adjusted by the following means: The screw-threaded stem 20 engages a threaded apertured block 21. The valve stem 19 may be adjusted in the block 21 by means of the screw to vary the minimum opening of the fuel valve. This is a permanent adjustment. The block 21 is mounted on trunnions in the lever 22. The latter is pivoted to swing vertically on the lever 23 which is secured to the neck 24 of the barrel valve by means of a split collar tightened by the screw 24′. It is apparent that the barrel valve may be given any angular position relatively to the lever, and vice versa, to give the valves the desired lead. This is also termed a permanent adjustment. On this cover is a cam 26. This is preferably mounted on a pivot 27 to swing in a vertical plane. The cam is adjusted about the pivot by means of a screw 28 having a bearing on the cover to vary its throw and pitch, but is normally stationary. A follower 29 on the lever 22 engages the cam and opens and closes the valve 19 as the barrel valve is rotated, moving the follower over the cam.

As has been stated, an important feature of this invention resides in the arrangement of the air inlets and the throttle opening and in their configuration. It will be noted that the throttle opening or port 17 is provided with a lead notch 30. This notch registers with the outlet opening 4 when the stops 31 and 32 are in contact. This gives the minimum throttle or throttle lead opening. In ordinary usage at low throttle and at full throttle, with a cam 26 which has its operative surface in a single plane, the carbureter operates successfully. However, under certain conditions at about half throttle the flow of gasolene tends to be insufficient. This might be overcome by changing the contour of the cam, but for various reasons it has been found desirable to make the cam surface substantially straight, that is to keep it in a single plane, so that the throw for a given arc is uniform at all points of the cam. The lead notch 30 serves to increase at mean throttle the proportion of throttle opening to the area of the constant air passage by which air is delivered to the fuel nozzle. Thus the suction about the fuel nozzle is increased and hence the richness of the charge at mean throttle is also increased.

In Figs. 2 and 3 I have shown another form of carbureter embodying the features of my invention. This carbureter is similar in form to that described in connection with Fig. 1, but differs therefrom principally in the means for adjusting the cam 26. In this device the lever 23 is permanently secured to the valve neck 24 by the screw 23′. As in the carbureter previously described, the valve chamber 2 has a stationary cover 25. Upon this rests a segmental plate 51 pivoted to swing about the neck 24 of the barrel valve. The plate 51 is provided with a bearing block 52 which is journaled on the hub 24, and this block is provided with trunnions 33 upon which the plate swings relatively to the block and in a vertical plane. The block 32 is also provided with a radial arm 34 which is slotted at 35 concentrically with the barrel valve axis, and a screw 36 engages the slot and is seated in the cover 25 of the barrel valve. Seated in a lug 37 near the center of the circumferential edge of the arcuate plate 51 is a vertical screw 38, and this screw bears at its lower extremity against a corresponding support 39 preferably on the cover 25. The cam 26 is pivotally mounted on the plate 31, the mounting of the cam on this plate being in every way similar to the mounting of the corresponding cam on the cover 25 in Fig. 1, that is, the cam is pivoted at 27 in a lug 27′ formed integrally with the plate 51, and is adjusted about the pivot 27 by means of a screw 28 having a bearing on the plate 51. When it is desired to change the timing of the cam and the lead of the throttle valve, *i. e.*, to vary the extent to which such valve opens prior to the movement of the fuel valve, and thereby vary the relative motions of the valves, the plate 51 is rotated about the hub 24 and held in adjusted position by means of the screw 36. This is a permanent adjustment to compensate for change of season, etc. When it is found desirable to vary temporarily the lead of the fuel valve and change temporarily its opening by a fixed amount for every position of the air valve, as in hill climbing or in starting in cold weather to warm up the carbureter, etc., the plate 51 is rotated about its trunnion bearings 33 by means of the screw 38. I have also described an adjustment for varying the throw of the cam whereby the ratio of the valve movements is varied, that is, by swinging it about the pivot 27. Before delivering, the carbureter is regulated as to the permanent adjustments. This op-

eration is described in my previous applications cited herein.

The operation of my device will be apparent from this description taken in connection with the statement of invention.

I have described in minute detail two embodiments of my invention in order that its nature and operation may be clearly understood. However, the specific terms herein are used in their descriptive rather than in their limiting sense and the scope of the invention is defined in the claims.

I claim—

1. In a constant level aspirating carbureter, a valve chamber, a barrel valve therein having a throttle port with a lead notch, a constant air opening and a secondary air port, a fuel nozzle, a fuel valve and means for actuating the valves and varying their relative motions, said means including a cam with its operative surface in a single plane and means for swinging the same and adjusting it in the plane of the direction of motion of the fuel valve, a follower for the cam, and means connecting it to the fuel valve.

2. In a constant level aspirating carbureter, a valve chamber, a barrel valve therein having a throttle port with a lead notch, a constant air opening and an air port, a fuel nozzle in the constant air opening, a fuel valve and means for actuating the valves and varying their motions relatively, said means being in the form of a stationary flat cam and a follower, the latter connected to the barrel valve to move therewith and connected to the fuel valve to actuate the same.

3. In a carbureter, a valve chamber, a barrel valve therein having a throttle port with a lead notch, a constant air opening, and an air port, a fuel nozzle in the constant air opening, a fuel valve and means for actuating the valves and varying their relative motions, said means including a cam and means for swinging the same and adjusting it in the plane of the direction of motion of the fuel valve, and a follower for the cam connected to the barrel valve to move therewith, and means connecting the follower to the fuel valve to actuate the same.

4. In an aspirating carbureter, a valve chamber, a rotary air valve therein, a fuel valve, means for opening and closing the fuel valve as the air valve is rotated, said means consisting of a cam, a follower, means connecting the follower to the air valve to move therewith and traverse the cam surface, the follower being connected to the fuel valve to open and close the same, and means for moving the cam body in the direction of motion of the fuel valve.

5. In an aspirating carbureter, a fuel valve, a rotary air valve therein having a constant air opening, an air port and a throttle port, a fuel valve, and means for opening and closing the fuel valve as the air valve is rotated, said means consisting of a cam, a follower, means connecting the follower to the rotary valve to move therewith and traverse the cam surface, the follower being also connected to the fuel valve to open and close the same, and means for moving the cam bodily in the direction of the fuel valve traverse.

6. In an aspirating carbureter, a valve chamber, a rotary valve therein having a throttle port, a fuel valve and means for opening and closing the fuel valve as the rotary valve is moved, said means consisting of a cam, a follower means connecting the follower to the rotary valve to move therewith and traverse the cam surface, the follower being connected to the fuel valve to open and close the same, and means for swinging the cam and adjusting its angular position in a plane transverse to the direction of motion of the fuel valve.

7. In an aspirating carbureter, a valve chamber, a rotary valve therein having a throttle port, a fuel valve and means for opening and closing the fuel valve as the rotary valve is moved, said means consisting of a cam, a follower, means connecting the follower to the rotary valve to move therewith and traverse the cam surface, the follower being connected to the fuel valve to open and close the same, means for swinging the cam and adjusting its angular position in a plane transverse to the direction of motion of the fuel valve, and means for moving the cam bodily in the direction of motion of the fuel valve.

8. In an aspirating carbureter, a valve chamber, a rotary valve therein having a throttle port, a fuel valve and means for opening and closing the fuel valve as the rotary valve is moved, said means consisting of a cam, a follower, means connecting the follower to the rotary valve to move therewith and traverse the cam surface, the follower being connected to the fuel valve to open and close the same, a support on which the cam is mounted, the support being pivoted to swing on an axis parallel to that of the rotary valve, and means for holding the support in any desired position of angular adjustment, whereby the cam may be rotated at will in a plane transverse to the direction of motion of the fuel valve.

9. In an aspirating carbureter, a valve chamber, a rotary valve therein having a throttle port a fuel valve and means for opening and closing the fuel valve as the rotary valve is moved, said means consisting of a cam, a follower, means connecting the follower to the rotary valve to move therewith and traverse the cam surface, the follower being connected to the fuel valve to

open and close the same, a support upon which the cam is mounted, the support being pivoted on an axis transverse to the direction of motion of the fuel valve, so that the support may be rotated in the plane of the direction of motion of the fuel valve moving the cam bodily in the direction of motion of the fuel valve, and means for holding the support in the desired position of adjustment about the said axis.

10. In an aspirating carbureter, a valve chamber, a rotary valve therein having a throttle port, a fuel valve and means for opening and closing the fuel valve as the rotary valve is moved, said means consisting of a cam, a follower, means connecting the follower to the rotary valve to move therewith and traverse the cam surface, the follower being connected to the fuel valve to open and close the same, a support upon which the cam is mounted, the support being pivoted to swing about an axis parallel to the axis of the rotary valve, and means for holding the support in any desired position of angular adjustment about said axis, the support also being pivoted on an axis transverse the direction of motion of the fuel valve to swing in the direction of such motion.

11. In an aspirating carbureter, a valve chamber, a throttle valve therein having a throttle port, a fuel valve and means for opening and closing the fuel valve as the throttle valve is moved, said means consisting of a cam, a follower, means connecting the follower to the throttle valve to move therewith and traverse the cam surface, the follower being connected to the fuel valve to open and close the same, a support upon which the cam is pivotally mounted to swing in the plane of the direction of motion of the fuel valve, and means holding the cam in the desired position of adjustment, the support being pivoted to swing in a plane transverse to the direction of motion of the fuel valve and means for holding the support in the desired position of angular adjustment.

12. In an aspirating carbureter, a valve chamber, a throttle valve therein, a fuel valve and means for opening and closing the fuel valve as the rotary valve is moved, said means consisting of a cam, a follower, means connecting the follower to the throttle valve to move therewith and traverse the cam surface, the follower being connected to the fuel valve to open and close the same, a support upon which the cam is pivotally mounted to swing relatively to the support in the plane of the direction of motion of the fuel valve, and means for holding the cam in the desired position of adjustment, the support being pivoted on an axis transverse to the direction of motion of the fuel valve so that it may be rotated to move the cam in the direction of motion of the fuel valve, and means for holding the support in the desired position of adjustment about said axis.

13. In an aspirating carbureter, a throttle valve, a fuel valve, means connecting the same to move together, means for adjusting said means to vary the lead of the fuel valve, and to vary temporarily by a fixed amount the opening of the fuel valve as related to that of the throttle at all positions.

14. In an aspirating carbureter, a throttle valve, a fuel valve, means for connecting the same to move together, means for adjusting said means to vary the lead of the fuel valve and to vary temporarily by a fixed amount the opening of the fuel valve as related to that of the throttle valve at all positions, and means for varying the relative motions of the valves.

15. In an aspirating carbureter, a throttle valve, a fuel valve, means connecting the same to move together, means for adjusting said means to vary the lead of the fuel valve and to vary by a fixed amount the opening of the fuel valve as releated to that of the throttle valve at all positions, and means for varying temporarily the timing of the relative motions.

Signed by me at Baltimore, Maryland, this 11th day of April 1912.

LEWIS M. KEIZER.

Witnesses:
EDWARD L. BASH,
EDWIN F. SAMUELS.