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CARBURETER.

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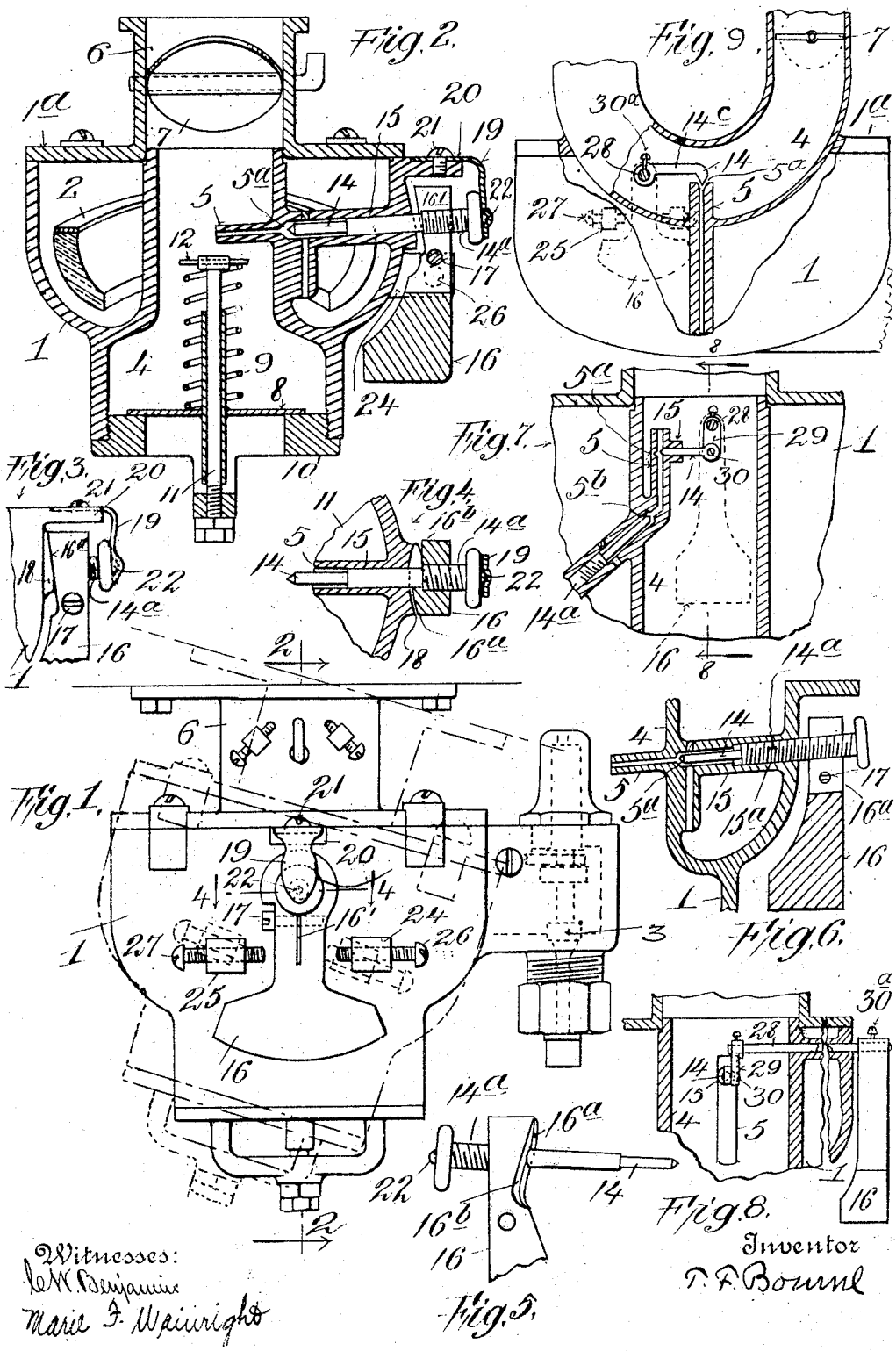

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CARBURETER.

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To all whom it may concern:

Be it known that I, THEODORE F. BOURNE, a citizen of the United States, and resident of Montclair, Essex county, New Jersey, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

My invention relates to improvements in carbureters particularly adapted for internal combustion engines, and has special reference to carbureters for use on vehicles.

It is desirable to operate internal combustion engines with the least amount of fuel to produce an effective mixture for the work being performed, and to maintain such effective mixture as the energy required increases or decreases, whereby a maximum efficiency of operation may be obtained with a minimum fuel cost for the work being done. The foregoing is especially desirable for the operation of vehicles propelled by internal combustion engines, to enable a relatively correct mixture to be used when traveling on the level, and as a grade is ascended or descended to so vary the quantity of the fuel as to maintain a relatively correct mixture for the increasing or decreasing load conditions on the engine caused by the grade, thereby gaining an economy and the advantage of engine efficiency according to the grade the vehicle may be traversing.

The object of my invention is to provide a carbureter having means for automatically varying the supply of fuel for the mixture when the carbureter inclines from a horizontal or level position, as when the vehicle, upon which the carbureter is mounted, ascends or descends from a substantially level position, whereby to obtain the advantage of automatically supplying additional fuel for the mixture when the vehicle inclines upwardly, and whereby also, when desired, the supply of fuel may be automatically reduced from the normal when the vehicle inclines downwardly.

In the example of my invention illustrated in the accompanying drawings, I provide a carbureter having any suitable or well known air passage, carbureting or mixing chamber, one or more fuel supply jets or nozzles communicating therewith, and a valve to control the same, with means, comprising a pendant or gravity device, operatively connected with said valve in such manner that the pendant will, while the carbureter is substantially horizontal, maintain the valve in its normal set position to permit a normal supply of fuel to flow, but when the carbureter is inclined with respect to the horizontal, the pendant hanging vertically and by suitable means coacting therewith will cause the valve to more or less open or close the jet or nozzle according to the inclination and direction of inclination of the carbureter as a whole with respect to the pendant.

My invention also comprises novel details of improvement and combinations of parts that will be more fully hereinafter set forth and then pointed out in the claims.

Reference is to be had to the accompanying drawings forming part hereof, wherein.

Figure 1 is a side view of a carbureter provided with my improvements; Fig. 2 is a vertical section substantially on the line 2, 2, in Fig. 1; Fig. 3 is a detail side view looking from the left in Fig. 1; Fig. 4 is a detail section substantially on the line 4, 4, in Fig. 1: Fig. 5 is a detail perspective of the needle valve and a portion of the pendant or gravity device: Fig. 6 is a detail sectional view illustrating modified means for causing automatic operation of the needle valve: Fig. 7 is a central section of a portion of a carbureter, illustrating a modification: Fig. 8 is a section on the line 8, 8, in Fig. 7, and Fig. 9 is a partly sectional detail view of a carbureter illustrating a further modification.

Similar numerals of reference indicate corresponding parts in the several views.

My improvements may be embodied in any suitable type of jet supply carbureter. I have shown the carbureter provided with a usual fuel supply chamber or bowl 1, having a float 2 and valve 3. In the example illustrated in Figs. 1 to 8 the carbureter has a central passage 4, providing a carbureting or mixing chamber, into which the jet or nozzle 5 projects from chamber 1, while in Fig. 9 the passage or carbureting or mixing chamber 4 is shown above the float chamber and carried by the cover 1^a. In Figs. 1 and 2 the passage 6 for the mixture is upon cover 1^a and communicates with carbureting or mixing chamber 4.

At 7 is a usual throttle or valve for controlling the mixture flowing to the engine.

As so far described the parts may be of any suitable or usual construction. The carbureting or mixing chamber may be provided with a valve 8 controlled by a spring

9, which valve, in Figs. 1 and 2, is shown carried by a cage or the like 10 removably attached, as by screw threads, to the bottom of the float chamber, such cage being shown provided with a stem 11, upon which valve 8 is guided, said stem having a stop 12 for the upper end of the spring, the lower end of which spring is shown bearing upon valve 8, although any suitable arrangement of air controlling valve may be used. The air controlling valve may be dispensed with if desired.

The jet or nozzle 5 is controlled by valve 14 to regulate the flow of fuel therefrom. In the example illustrated in Figs. 1 to 5, valve 14 is shown guided in a bearing 15 extending across the float chamber, in which bearing the stem of valve 14 is adapted to rock and slide automatically. To the valve 14 is connected a device for automatically operating the valve. For this purpose I have shown a pendant or gravity member 16, suitably connected with valve 14 to operate the latter. In said figures the outer part of the stem of valve 14 is shown threaded at 14^a and meshing with threads in a bore in the pendant, whereby the needle valve may be adjusted with respect to seat 5^a and the pendant. To hold the pendant firmly clamped on the needle valve after adjustment of the latter, I have shown the pendant 16 as divided at 16′ and provided with screw 17, for clamping the pendant in set position upon the needle valve. To cause the needle valve to move outwardly or inwardly relatively to seat 5^a as the carbureter, as a whole, moves relatively to the vertically hanging pendant, suitable means may be provided. For this purpose, in Figs. 1 to 5, I have shown an inclined or cam-like projection or surface 18, on the exterior of chamber 1, that coacts with the pendant, the latter being shown provided with a suitable or corresponding inclined or cam-like surface 16^a in contact with the cam-like surface 18. The side of pendant 16 opposite the part 16^a may be cut away, at 16^b, to permit free movement of the pendant and carbureter with respect to one another without affecting the relative location of said parts. The arrangement is such that with the needle valve set in the desired position with respect to the pendant 16 and the seat 5^a, and the pendant suspended by the needle valve from the carbureter, the needle valve will be maintained in such normal or set position with respect to seat 5^a by the hanging pendant or gravity member 16 so long as the carbureter is in a horizontal or level position, but if the carbureter be tilted (as in dotted lines in Fig. 1) in one direction from the horizontal, the pendant will still hang vertically and the cam-surface 18 acting with the surface 16^a of the pendant will cause the latter and valve 14 to move outwardly or away from seat 5^a, and correspondingly, if the carbureter tilts from the horizontal or level position in a direction reverse to that described, the pendant by coaction of its surface 16^a with cam surface 18, will permit the needle valve to move inwardly or toward the seat 5^a, thereby automatically increasing or diminishing the distance between the needle valve and seat 5^a for varying the area of the fuel supply passage and the supply of fuel permitted to flow from jet 5. To prevent the needle valve from sliding outwardly other than as influenced by the action of the pendant, I provide an abutment 19 against the outer end of the valve, which abutment is shown in the form of a spring depending in front of the outer end of the valve, and attached to the carbureter body upon the lug 20 and held by screw 21, permitting the needle valve to have free rotation. To reduce friction between abutment 19 and the needle valve the latter is shown provided with a projection 22, which may be in ball-like form bearing against the spring.

I have shown the needle valve 14 and its bearing 15 inclined downwardly and inwardly with respect to the vertical axis of the carbureter, whereby the tendency of the needle valve is to slide inwardly toward seat 5^a, to aid in maintaining the normal positions of the parts.

To limit or control the relative and independent movement of the carbureter with respect to the pendant, or vice versa, I have shown stops carried by the carbureter on opposite sides of the pendant, against which the pendant may abut. The stops I have shown comprise lugs 24, 25 on the float chamber, suitably spaced apart to permit movement of the pendant therebetween, and screws 26, 27 carried by said lugs and adapted to engage the pendant may be set in desired positions to limit the swing of the pendant and carbureter independently of each other.

To cause automatic movement of the needle valve with respect to seat 5^a other means in conjunction with the pendant or gravity device than that described may be provided, such as by causing the threads 14^a upon the needle valve to mesh in corresponding threads 15^a in the bearing 15, and by clamping the pendant 16, as by a screw 17, securely upon the valve, see Fig. 6. In this manner the needle valve first may be adjusted as desired by means of threads 14^a, 15^a with respect to seat 5^a and then the pendant will be clamped securely to the valve, whereby when the carbureter tilts with respect to the vertically hanging pendant, the action of the threads 14^a, 15^a will cause the needle valve to be moved more or less toward or from the seat 5^a according to the direction and degree of inclination of the carbureter

with respect to the pendant hanging from the valve.

In Figs. 7 and 8 I have shown valve 14 located within the chamber or passage 4, and a shaft 28 passing through the wall of the carbureter, and carrying at its inner end within chamber 4 a crank or arm 29 pivotally connected, as at 30, with valve 14, and connected at its outer end with pendant 16 outside of chamber 1, whereby as the carbureter moves with respect to the vertically hanging pendant the valve will be moved more or less across the passage of jet or nozzle 5 to regulate the flow of fuel therethrough. Seat 5^a may be provided to coact with valve 14, and a seat 5^b may also be provided to coact with a valve 14^a operated in any usual manner by hand, to control the normal flow of fuel to jet or nozzle 5. The relative position of valve 14 with respect to the pendant 16, in Figs. 7 and 8, may be adjusted by means of a screw 30^a which may securely connect shaft 28 with the pendant in adjusted position for regulating the position of valve 14 with respect to the flow of fuel through jet or nozzle 5.

In Fig. 9 I have shown valve 14 as adapted to rock with respect to jet or nozzle 5. For this purpose valve 14 may be carried upon a rock arm 14^c secured upon shaft 28 to which pendant 16 is connected, as by screws 30^a, in manner before described respecting Figs. 7 and 8, whereby valve 14 may be set as required to permit the normal desired flow of fuel from the jet, and as the carbureter tilts with respect to the vertical position of the pendant the supply of fuel flowing from the jet is automatically increased or decreased.

By means of my improvements, the valve 14 may be set in desired operative relation to the jet or the valve seat, and with respect to the vertical position of the pendant for production of the desired mixture for the work of an engine under usual conditions, as when traveling substantially horizontally, and the movement imparted to valve 14 with respect to the jet by the relative movement of the carbureter body with respect to the vertically hanging pendant will automatically regulate the amount of additional fuel supply, or fuel decrease, permitted to be drawn from the jet according to the inclination and degree of inclination that the carbureter assumes at any given time. Therefore, no attention is required on the part of the user to increase or decrease from the normal the supply of fuel flowing from the jet. With the carbureter mounted upon a vehicle and the same traveling on the level, the normal or initial supply of fuel permitted for the jet will be drawn by the engine as customary with carbureters equipped with jets and needle valves, but as soon as the vehicle ascends, so that the carbureter inclines forwardly in an upward direction, the needle valve will be caused to move outwardly or away from the jet passage or seat to permit more fuel to be drawn, and such movement will be in proportion to the inclination of the carbureter with respect to the horizontal. According to the pitch or inclination of cam surfaces 18 and 16^a or threads 14^a, 15^a (as well as the relative arrangement of the parts 29 or 14^c) the needle valve will be caused to move more or less quickly for a given inclination of the carbureter with respect to the pendant 16. When the vehicle inclines from the horizontal downwardly, as in descending a grade, the supply of fuel will be reduced proportionately by valve 14 closing toward seat 5^a. Of course, if it is not desired to reduce the supply of fuel from the normal when the vehicle descends a grade, the pendant may be caused to incline with the carbureter, as by setting screw 27 against the pendant when the latter is in the vertical position; and, likewise, the degree of inclination of the carbureter independently of and with respect to the pendant may be regulated in either direction of inclination of the carbureter by setting screw 26 or 27 more or less near the pendant as desired. For instance, if it is desired to limit the swing of the carbureter independently of the pendant within certain limits, as, for instance, not to permit the carbureter to tilt with respect to the pendant more than equivalent to the vehicle climbing or descending, say, a 20% grade, the movement of the carbureter with respect to the pendant may be limited to that extent, and so on in proportions desired.

It will be understood that in all cases, after the carbureter has returned from an inclined position to the horizontal position, that the action of the pendant and the cam, threads, arm or the like that causes automatic action of the valve, will be to restore the latter to the normal or set position.

From the foregoing it will be apparent that the valve may be set to permit the engine to operate, as upon the level, with a relatively correct mixture, and the quantity of the fuel will be varied automatically to maintain a relatively correct mixture for the increasing or decreasing load conditions on the engine, according to the inclination of the carbureter, whereby excessive continued use of more fuel than necessary when traveling on the level may be avoided, thus economizing fuel consumption and cost, or in other words, the required amount of fuel for heavy work, such as hill climbing, may be instantly and automatically supplied, when the hill is reached, according to the movements of the carbureter with respect to the valve and pendant.

By the term "pendant" as herein used, I mean a device or weight hanging or operat-

ing by gravity adapted to cause the valve that controls the flow of fuel from the jet to move more or less from a normal or set position, and by the term "vehicle" I mean any conveyance utilizing an internal combustion engine for its propulsion, such as an automobile, aeroplane, dirigible balloon, boat and the like, although, of course, my improved carbureter may be used in any desired relation.

While I have illustrated and described a carbureter having a single jet, valve and pendant, it will be understood that more than one of such sets of parts may be provided if desired, and that changes may be made in the details and arrangements set forth, within the scope of the appended claims, without departing from the spirit of the invention.

Having now described my invention what I claim is:—

1. A carbureter for internal combustion engines having a passage to supply fuel for a mixture, and means to automatically vary the area of such fuel supply passage according to the inclination of the carbureter with respect to the horizontal.

2. A carbureter for internal combustion engines having a fuel supply jet, means to control the normal flow of fuel from said jet, and means to automatically operate the first named means to vary the flow of fuel from said jet according to the inclination of the carbureter with respect to the horizontal.

3. A carbureter for internal combustion engines having a fuel supply jet and a valve therefor, and means to automatically operate said valve to vary the flow of fuel from said jet according to the inclination of the carbureter with respect to the horizontal.

4. A carbureter for internal combustion engines having a carbureting chamber, means to supply fuel thereto, means to control said supply, and gravity operated means connected with said controlling means to automatically vary such fuel supply according to the inclination of some of the parts with respect to the horizontal.

5. A carbureter for internal combustion engines having a carbureting chamber, a fuel supply jet communicating therewith, means to regulate the flow of fuel from the jet, and a pendant operatively connected with said means to vary the flow of fuel according to the position of the carbureter with respect to the pendant.

6. A carbureter for internal combustion engines having a carbureting chamber, a fuel supply jet communicating therewith, a valve to regulate the flow from said jet, a pendant connected with said valve, and means to cause movement of said valve upon tilting of the carbureter with respect to said pendant.

7. A carbureter for internal combustion engines having a carbureting chamber, means to supply fuel thereto, means to control said supply, a pendant connected with said means to automatically vary such supply according to the position of the carbureter with respect to the horizontal, and means to limit relative movement of the carbureter with respect to the pendant.

8. A carbureter for internal combustion engines having a fuel supply jet, a valve for said jet, disposed substantially transversely of the carbureter, a pendant connected with said valve, and means to cause automatic movement of the valve relatively to the carbureter.

9. A carbureter for internal combustion engines having a fuel supply passage, a carbureting chamber communicating therewith, and means carried by the carbureter to automatically increase and decrease the area of said fuel supply passage according to the inclination of the carbureter.

10. A carbureter for internal combustion engines having a fuel supply passage, a valve therefor, a weighted member, and means to cause said member to operate said valve to more or less open said passage according to the inclination of the carbureter.

11. A carbureter for internal combustion engines having a carbureting chamber, a fuel jet communicating therewith, means to vary the flow of fuel from said jet, a member carried by the carbureter and operated by gravity, and means to cause said member to automatically operate said means according to the inclination of the parts.

12. A carbureter for internal combustion engines having a carbureting chamber, a jet to supply fuel thereto, means to control said jet, a gravity member, and means to cause said member to operate said jet controlling means to vary the flow from said jet upon inclination of some of the parts with respect to the horizontal.

13. A carbureter for internal combustion engines having a fuel jet, a valve to control said jet, a gravity member pivotally supported to operate said valve, and means eccentric to the axis of said member to cause the latter to operate said valve.

14. A carbureter comprising a carbureting chamber and a fuel chamber, means to maintain a constant fuel level in the fuel chamber, means to admit fuel from said fuel chamber to said carbureting chamber, and means to automatically vary the volume of fuel admitted to said carbureting chamber from said fuel chamber according to the inclination of some of the parts with respect to the horizontal.

15. A carbureter for internal combustion engines having a carbureting chamber, a passage for the supply of fuel thereto, means to control the flow of fuel through the passage, and means associated with the carbu-

reter and said controlling means actuated by gravity to cause movement of the carbureter an said second named means with relation to one another upon inclination of some of the parts with respect to the horizontal.

Signed at New York city, in the county of New York and State of New York, this 18th day of June, A. D. 1912.

THEODORE F. BOURNE.

Witnesses:
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