R. M. ANDERSON.

CARBURETER.

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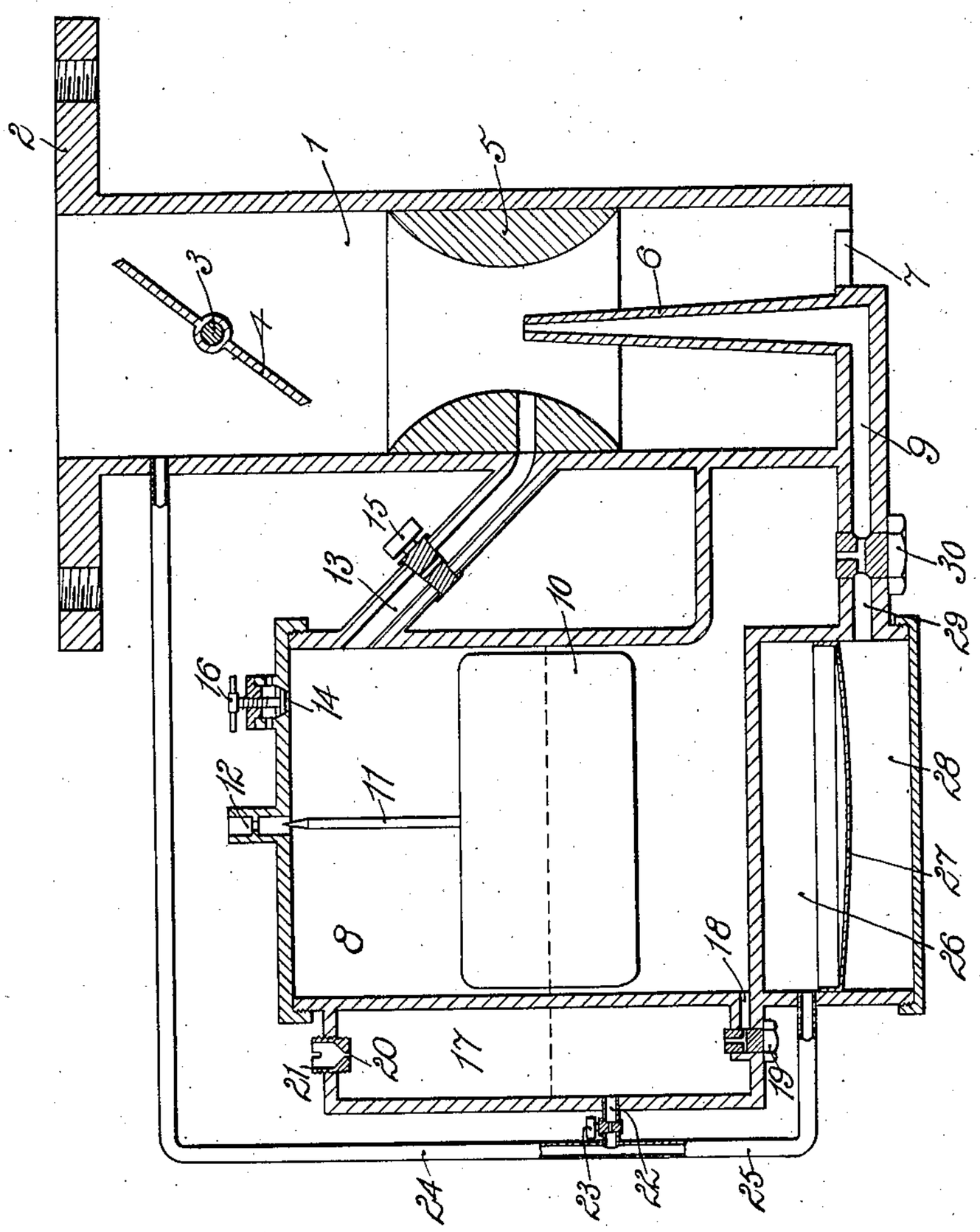
1,166,734.

Patented Jan. 4, 1916.



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CARBURETER.

1,166,734. Specification of Letters Patent. Patented Jan. 4, 1916.

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To all whom it may concern:

Be it known that I, RAYMOND M. ANDERSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Carbureters, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to the art of carburation for internal combustion engine purposes and is concerned with the maintenance of proper proportions between the constituents of the combustible mixture at various engine speeds.

My invention is therefore adapted to be applied to an engine, such as an automobile engine, wherein the speed is necessarily varied. I employ a throttle valve which controls the admission of the combustible mixture to the engine, and as the throttle valve is made to assume its various positions I secure a certain control of the fuel feed so that a rich mixture is secured upon starting, so that the feed on higher speeds is properly and correspondingly restricted to secure the desirable relatively leaner mixture and at the same time to economize in fuel, and so that the transfer from the rich to the lean mixture may be made effectively and gradually, and adjustably so to meet changes in conditions.

Broadly speaking, I provide a carbureting chamber or passage and associate with it a float chamber in which the pressure is such as to give the desired feed from a main fuel nozzle leading from the float chamber and disposed in said carbureting chamber or passage. At the same time, I provide an auxiliary reservoir in communication with the float chamber from which reservoir another nozzle leads, preferably to a point in proximity to the throttle, and in which reservoir the pressure is independently maintained and preferably made adjustable, as will be described. As an auxiliary feature, I provide a pump which may act spasmodically upon the sudden opening of the throttle so that additional fuel may be thrust into the carbureting passage.

My invention will be best understood by reference to the accompanying drawing which shows a longitudinal axial sectional view of a carbureter, embodying the various features of my invention.

The carbureting chamber or passage is illustrated at 1 and it will be seen that it is provided at its upper end with the flange 2 by means of which it may be connected to the manifold of an engine. A shaft 3 extends diametrically across the passage 1 and carries the throttle valve 4, any suitable means being provided for oscillating the shaft 3. At about the middle of the carbureting passage 1 a choking or restricting ring 5, commonly known as a "Venturi tube", is provided and a main fuel supply nozzle 6 extends into the restricted zone of this tube. The nozzle 6 is supported from a spider 7 at the bottom of the passage 1.

A float chamber 8 is mounted as part of the structure and the nozzle 6 is adapted to be fed from this float chamber by means of a passageway 9. The float chamber is provided with a float 10 which carries a needle valve 11 which in turn controls a passageway 12 which, by any suitable means, is connected with the primary supply reservoir. It will be seen that when the float rises the valve 11 will close the passage 12 and prevent the further entry of fuel until some of the fuel has been consumed. Then the float will drop and allow the entry of fuel so that a substantially constant level is maintained. As an additional economizer feature which may or may not be employed, as desired, the float chamber, over the liquid level, is connected with the restricted zone of the carbureting chamber or passage by means of a passageway 13. The atmosphere is admitted to the top of the float chamber through the opening 14. If desired, a valve 15 may control the size of the passageway 13 and a valve 16 may control the size of the opening 14, this opening 14 necessarily being somewhat restricted when the passageway 13 is employed.

The auxiliary fuel reservoir is illustrated at 17 and it will be seen that it is connected at the bottom to the main reservoir by means of a passageway 18, the size of which is controlled by an adjusting valve 19. By this connection the auxiliary reservoir gets its fuel from the main reservoir and the float mechanism in the main reservoir serves

to determine the initial fuel level in the auxiliary reservoir, that is, the fuel level with the carbureter at rest. The atmosphere is admitted to the top of the auxiliary reservoir 17 through a restricted passageway 20 in a plug 21 fitting in the closed top of this auxiliary reservoir and it will be seen that this plug may have another substituted therefor if it is desired to change the size of the atmosphere inlet.

Below the normal level of the liquid fuel in the main reservoir and the initial level in the auxiliary reservoir, the auxiliary reservoir has an outlet 22, which may be controlled by an adjusting valve 23, which by means of the pipe 24, is connected with the carbureting passageway 1, on the engine side of the throttle, in the specific embodiment herein shown.

Referring now to the auxiliary pump to which I have referred, and which may or may not be employed, it will be seen that a branch pipe 25 extends downwardly from the pipe 24 to a diaphragm chamber 26, the bottom of which is in the form of a diaphragm 27. Below this diaphragm is a fuel well 28 which, by means of a passageway 29, is connected with the float chamber 8. The connection between the passageways 29 and 9 and the float chamber 8 is controlled by means of properly restricted passageways in a removable plug 30.

It will be seen that if the engine were to be turned over on closed or nearly closed throttle, the entire or at least high vacuum thus produced would be effective through the pipe 24, the nozzle 6 being exposed practically to the atmosphere. This would draw a high charge of fuel from the auxiliary reservoir 17, as determined by the initial fuel level up through the pipe 24 and into the engine. It will thus be understood that when the throttle valve is opened slightly the vacuum will be decreased but there still will be a very low pressure effective through the pipe 24 and at the same time air will be admitted. In this way, the rich starting mixture is secured. It will always be kept in mind that when the throttle is opened wider there will be a temporary decrease in the vacuum until the engine has picked up the speed and extra feed desired upon sudden accelerations is secured as will be pointed out. Upon higher speeds when large volumes of air pass through the Venturi tube, the suction produced on the nozzle 6 is effective in drawing fuel directly from the float chamber 8. This action, if desired or necessary, may be moderated by the provision of the passageway 13, making it of the proper size relative to the atmosphere inlet 14, so that at the higher speeds the feed will be held back by the decrease in the pressure in the top of the float chamber to a proportionate degree. It will be clear that this effect on the fuel in the main float chamber will also effectively change the rate at which the liquid passes through the passageway 18 into the auxiliary chamber and thus it will be seen that when the passageway 13 is employed the suction at the zone of the Venturi tube controls the issue of fuel from the pipe 24 into the carbureting chamber or passage at the throttle, and since the top of the reservoir is closed and atmosphere is admitted only through the restricted opening, the rate of passage of fuel through the passage 18 is subject to this control which has just been pointed out and the relative vacuum above and below the throttle will determine the level of fuel in the auxiliary chamber. At high speeds the pressure in the main float chamber becomes so much lower than the pressure in the auxiliary chamber that the flow between the two chambers is reversed and this illustrates the most pointed feature of this control. At a certain balance of pressures there will be no flow at all and I have determined by experiment that the result is an efficient mixture at the various speeds.

When the passageway 13 is not employed there is a substantially constant head on the fuel in the nozzle 6. On the other hand, the independent restriction of the atmosphere inlet to the auxiliary reservoir 17 holds back the feed through outlet 22 and pipe 24 sufficiently to span the gap between the initial starting supply from the reservoir 17 and the feed from the nozzle 6, as the throttle is moved from closed or nearly closed position to open position. By the proper adjustment of the opening 20 the holding back of the fuel may be adjusted, it being clear that the smaller the opening 20 the greater will be the effect of the suction transmitted through pipe 24 to the fuel in the auxiliary well. After the nozzle 6 has begun to feed, the feed, if any, through the pipe 24 is of no moment.

It will be seen that the well 28 will contain gasolene. When the vacuum above the throttle is suddenly increased the diaphragm 27 will be brought up and upon release will snap back pumping oil suddenly out of the nozzle 6. This takes place upon starting if the throttle is opened far enough and thereafter when the throttle is moved to secure sudden acceleration. As pointed out, this feature may or may not be employed with the other features already pointed out.

In order that those skilled in the art may be aided in the practice of my invention, I point out that the relative sizes of the various openings and passageways are important. In the specific embodiment of my invention which I have operated the nozzle 6 has a number 45 outlet (Brown & Sharpe standard); the passageways in the plug 30 were number 56; the passageways in the

plug 19 were number 65; the passageway in the valve 23 was number 53; the atmosphere inlet to the auxiliary chamber was number 58. The passageway 13 and the atmosphere inlet 14 for the main reservoir were adjusted by valves. It will be understood, however, that I do not wish to be limited to these precise proportions since efficient results may be obtained with other relative sizes and without departing from the spirit and scope of my invention.

As I have already pointed out, certain features of my invention may be employed advantageously without employing others, and I have therefore drawn the appended claims in such a way as to set forth various useful combinations, only the more specific of these claims being directed to a device including all of the features.

I claim:

1. In a carbureter, a carbureting passage, a throttle valve in said passage, a main reservoir having an independent opening to the atmosphere, an auxiliary reservoir connected therewith at the bottom, said auxiliary reservoir being otherwise closed except for a restricted connection to the carbureting passage and an independently restricted connection with the atmosphere whereby different pressures may be maintained in the respective reservoirs, and a nozzle in said passage connected with said main reservoir.

2. In a carbureter, a carbureting passage, a throttle in said passage, a fuel feed jet above said throttle, a reservoir for said jet, a fuel feed jet below said throttle, a reservoir for said second jet, a restricted passage between said reservoirs and an air passage between said second-named reservoir and said carbureting passage.

3. In a carbureter, a carbureting passage, a throttle in said passage, a fuel feed jet above said throttle, a reservoir for said jet, a fuel feed jet below said throttle, a reservoir for said second jet, a restricted passage between said reservoirs, and connection between the top of said last named reservoir and the carbureting passage below the throttle.

4. In a carbureter, a carbureting passage, a throttle in said passage, a fuel feed jet above said throttle, a reservoir for said jet, a fuel feed jet below said throttle, a reservoir for said second jet, a restricted passage between said reservoirs, connection between the top of said last named reservoir and the carbureting passage below the throttle, and a restricted atmosphere connection for said last named reservoir.

5. In a carbureter, a reservoir, a carbureting passage, a throttle in said passage, a jet in said passage connected with said reservoir, a well with a diaphragm wall connected with said reservoir, said well being connected with said jet, and a diaphragm chamber over said diaphragm connected with said passage beyond said throttle.

6. In a carbureter, a carbureting passage, one end of which is adapted to be connected with an engine and the other end of which is adapted to be connected with the atmosphere, a throttle near the engine end of said passage, a fuel nozzle near the atmosphere end of said passage, a float chamber having its lower end connected with said nozzle and its upper end connected through a valve with said passage near said nozzle, an atmosphere inlet for said float chamber, a valve in said inlet, an auxiliary fuel chamber having its bottom connected with the bottom of said float chamber, a connection between the auxiliary fuel chamber below the normal fuel level and the passage on the engine side of the throttle, a restricted atmosphere inlet for said auxiliary chamber, a well connected with said float chamber and said nozzle, and a diaphragm chamber over said well connected with said passage on the engine side of the throttle.

7. In a carbureter, a carbureting passage, a throttle valve in said passage, a fuel nozzle in said passage below said throttle valve, a liquid fuel reservoir having an atmosphere port and supplying said fuel nozzle, means for maintaining a substantially constant level of liquid fuel in said reservoir, an auxiliary well having an atmosphere port and a direct connection with said reservoir by which connection said auxiliary well is fed with liquid fuel directly from said reservoir, the atmosphere port for said auxiliary well being restricted to maintain sub-atmospheric pressure in said auxiliary well, and a passageway leading from said auxiliary well to said carbureting passage to feed fuel to said carbureting passage.

8. In a carbureter, a carbureting passage, a throttle-valve in said passage, a fuel-nozzle in said passage below said throttle-valve, a liquid fuel reservoir having an atmosphere port and supplying said fuel nozzle, means for maintaining a substantially constant level of liquid fuel in said reservoir, an auxiliary well having an atmosphere port and fed with liquid fuel from said reservoir, the atmosphere port for said auxiliary well being restricted to maintain sub-atmospheric pressure in said auxiliary well, and a passageway leading from said auxiliary well to said carbureting passage to feed fuel to said carbureting passage.

9. In a carbureter, a carbureting passage, a throttle in said passage, a fuel feed jet above said throttle, a reservoir for said jet, a fuel feed jet below siad throttle, a reservoir for said second jet, means in said second-named reservoir for maintaining a substantially constant level of fuel therein, a restricted passage directly connecting said reservoirs whereby said second-named reser-

voir directly feeds said first-named reservoir, and an air passage between said second-named reservoir and said carbureting passage.

10. In a carbureter, a carbureting passage, a throttle-valve in said passage, a fuel-nozzle in said passage below said throttle-valve, a liquid fuel reservoir having an atmosphere port and supplying said fuel-nozzle, means for maintaining a substantially constant level of liquid fuel in said reservoir, an auxiliary well having an atmosphere port and fed with liquid fuel from said reservoir, the atmosphere port for said auxiliary well being restricted to maintain sub-atmospheric pressure in said auxiliary well, and a passageway leading from said auxiliary well to said carbureting passage in proximity to the throttle.

11. In a carbureter, a carbureting passage, a throttle-valve in said passage, a fuel-nozzle in said passage below said throttle-valve, a liquid fuel reservoir having an atmosphere port and supplying said fuel-nozzle, means for maintaining a substantially constant level of liquid fuel in said reservoir, an auxiliary well having an atmosphere port and fed with liquid fuel from said reservoir, means for restricting and varying the atmosphere port for said auxiliary well to maintain and adjust sub-atmospheric pressure in said auxiliary well, and a passageway leading from said auxiliary well to said carbureting passage to feed fuel to said carbureting passage.

12. In a carbureter, a carbureting passage, a throttle-valve in said passage, a fuel-nozzle in said passage below said throttle-valve, a liquid fuel reservoir having an atmosphere port and supplying said fuel nozzle, means for maintaining a substantially constant level of liquid fuel in said reservoir, an auxiliary well having an atmosphere port and fed with liquid fuel from said reservoir, means for varying the size of the atmosphere port for said auxiliary well, and a passageway leading from said auxiliary well to the carbureting chamber in proximity to the throttle to coöperate with a comparatively small flow past the throttle.

13. In a carbureter, a carbureting passage, a throttle-valve in said passage, a fuel-nozzle in said passage below said throttle-valve, a liquid fuel reservoir having an atmosphere port and supplying said fuel-nozzle, means for maintaining a substantially constant level of liquid fuel in said reservoir, an auxiliary well having an atmosphere port and fed with liquid fuel from said reservoir through a restricted opening, the atmosphere port for said auxiliary well being restricted to maintain sub-atmospheric pressure in said auxiliary well, and a passageway leading from said auxiliary well to said carbureting passage in proximity to the throttle.

14. In a carbureter, a carbureting passage, a throttle for forming a restriction in said passage, a fuel chamber feeding into said passage below the restriction formed by the throttle, an auxiliary chamber fed from said fuel chamber and feeding into said passage below the restriction formed by the throttle, and a connection between said passage above the restriction formed by the throttle and said auxiliary chamber to hold back the accumulated fuel in said auxiliary chamber when the suction on the connection is comparatively high and to release said accumulated fuel when the suction in the connection is reduced.

15. In a carbureter, a carbureting passage, a throttle therein, a fuel chamber feeding into said passage, an auxiliary chamber fed from said fuel chamber and also feeding into said passage, and means for positively pumping the fuel from said auxiliary chamber into said passage, the operation of said pumping means being induced by the opening of the throttle.

In witness whereof, I hereunto subscribe my name this 13th day of February, A. D., 1912.

RAYMOND M. ANDERSON.

Witnesses:

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