

Aug. 26, 1930.

R. ZAMBELLI ET AL

1,774,218

CHARGE FORMING DEVICE

Filed Jan. 30, 1928

2 Sheets-Sheet 1

Fig. 1.

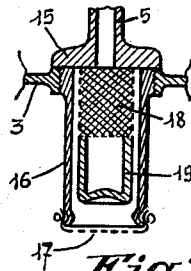
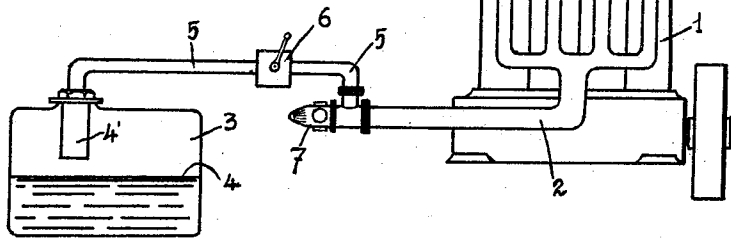


Fig. 2.

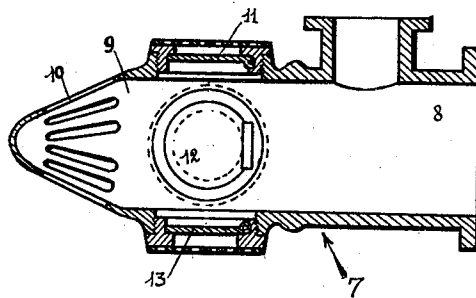


Fig. 3.

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2 Sheets-Sheet 2

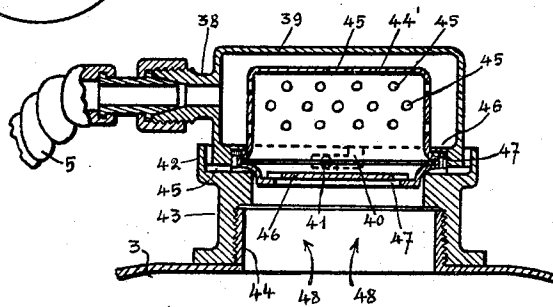
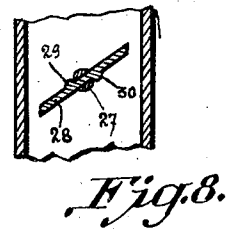
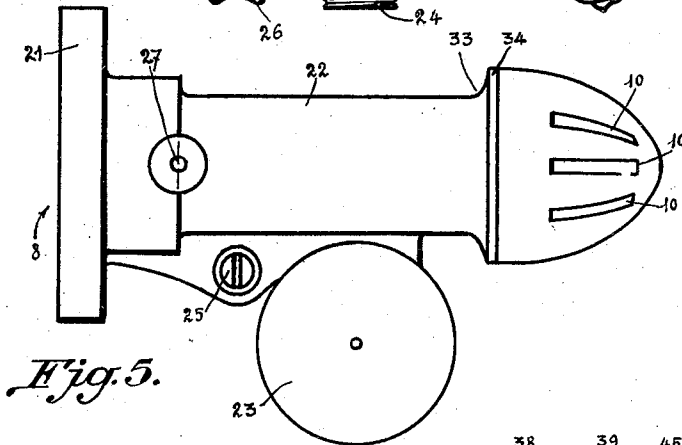
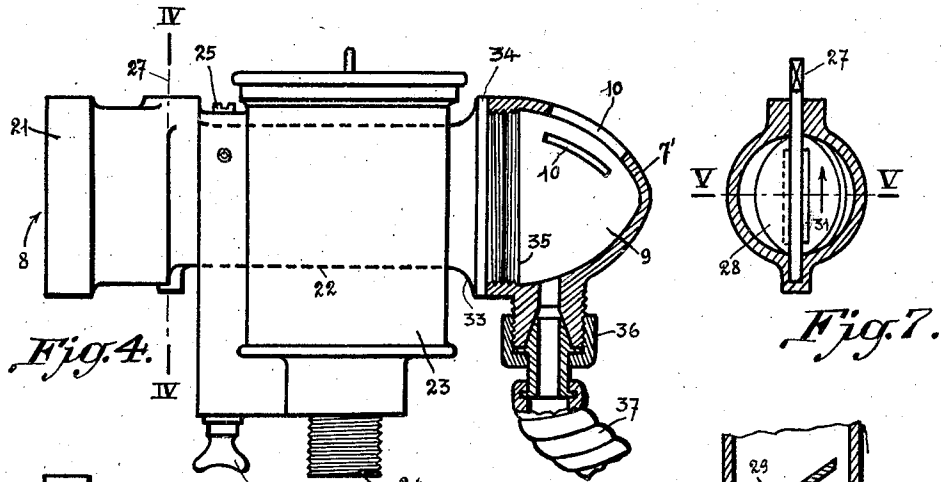


Fig. 6.

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UNITED STATES PATENT OFFICE

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CHARGE-FORMING DEVICE

Application filed January 30, 1928, Serial No. 250,670, and in Italy March 4, 1927.

The present invention relates to a feeding system for explosion engines and more particularly to a carbureting apparatus.

The system is based on the principle of utilizing the petrol gases which develop in the petrol tank, for feeding the engine; the device is based on the principle of obtaining said development and the formation of the mixture necessary for that purpose.

The invention has been carried out by obtaining the development of the petrol gases both in the main petrol tank for the engine and in an auxiliary tank, fed in any suitable manner, from the aforementioned main tank; it being only necessary that the tank wherein the petrol gases develop, should have space enough to contain the necessary quantity of petrol gases and that the petrol in the tank should present an evaporating surface of such extent as to produce the necessary quantity of gases for the working of the engine; said evaporating surface may be increased so as to render it of considerable extent even in a tank of small dimensions.

The invention has been carried out by causing the interior of the cylinders to communicate with the space above the petrol inside the tank, so that the depression produced by the movement of the pistons is transmitted to the said space, eventually through devices driven by hand or automatically.

The invention also contemplates the use of both constant (permanent) or adjustable openings or of one or other of these through which the petrol gases or the air, required to form the mixture, pass in such proportion as to render a suitable feed for the engine.

The means for controlling the adjustable opening (for example—springs) may, in certain cases be such as to cause these to open successively so as to permit of the passage of such different quantities of fluid as may be required by the various conditions of the working of the engine.

The device realized in practice in accordance with the preceding conceptions, may be so constructed as to utilize only the afore-said principles; or the complete device may be the combination of a common carburetter whereto new parts are applied capable of

adding petrol gases a mixture of air and to the common mixture of air and particles.

Further the invention has been carried out by predisposing suitable filters, perforated plates or the like in correspondence with the petrol tank, inside which the petrol gases will be developed, which cause a filtering of the obtained gases and prevent the dragging away of the smallest particles in liquid condition.

The device according to the present invention, with regard to existing carburating devices, also presents the improvement consisting in that the lower end of the nozzle is so formed as to permit of its being readily dismantled and a further improvement consisting in that the wing valves situated in the pipes may be directly disconnected from their driving shafts thus eliminating actually encountered difficulties.

Fig. 1 shows the general plan or arrangement.

Fig. 2 shows in detail on a larger scale, the device for drawing the petrol gases.

Fig. 3 shows in axial section the details for the suitable control of the drawing off of the atmospherical air.

Fig. 4 shows partially an outside view and partially an axial section of a carbureter to which has been added a new part, designed to cooperate in the feeding of the engine in accordance with the system of the present invention.

Fig. 5 shows a plan view of the device in Fig. 1, Fig. 6 is an axial vertical section of the connection of the device to the petrol tank or to the auxiliary petrol tank fed from the main tank, and lastly Figs. 7 and 8 show two sections, at right angles to each other, of the shaft and of the valve.

Referring more particularly to the embodiment shown in Figs. 1 to 3 (1) denotes the engine, 2 the mixture feeding pipe, 3 the tank wherein the petrol gases are developed, 4 the petrol level; 4' is the means for drawing off the petrol gases alone, 5 denotes the pipe through which said gases are conveyed to the air inlet device, from the outside, 6 a valve which is contained in this pipe for the purpose of controlling the suction of the quantity of

petrol gases, 7 denotes the device for effecting the suction of the air and for mixing same with the aforesaid petrol gases; the mixture so obtained is conveyed from the device 7 to the engine through pipe 2.

The working of the engine produces a suction inside the pipe 2, said suction increases in relation to the number of revolutions of the engine, and extends as far as the chamber 8 of the device 7. This suction produces the following effects in said chamber firstly; it passes along the pipe 5 through valve 6, and reaches the chamber above the petrol level in the petrol tank, and secondly it extends into the successive chamber 9 at the end of the device 7; where the several openings for the admission of the atmospherical air are situated. The depression produced by the running of the engine, affords therefore both the suction of atmospherical air through said openings and the suction of petrol gases through the pipe 6; these two gases are assembled in the chamber 8 wherein they form an intimate mixture, both because they are each in the form of gas and because the directions from which they reach the chamber 8 are at an angle to each other; the mixture so produced passes into the engine.

Referring more particularly to Fig. 2, 15 denotes the threaded fastening device of the pipe 5 to the tank 3, 16 a pipe opened downwards and fitted with filter (metallic net, pumice stone disc, etc.) or with other suitable porous material, 17 a further pipe concentric and inside the first, but closed at the lower end, the upper end of which is connected to a net or piece of porous material 18 at the opening of the pipe 5.

The illustrated device permits of obtaining, partially automatically and partially by hand, the finest graduation of the mixture and its adjustment in relation with the working conditions of the engine. In fact, by means of the valve 6, controlled by hand, it is possible to reduce or restrict the passage way through which the petrol gases pass which will be suitably proportional in relation to the quantity of air, whilst in the chamber 9 a quantity of air proportional to the engine speed will automatically penetrate; in fact, said chamber is provided with a certain number of openings as well as with one or more valves with adjustable springs (11, 12 and 13). The adjustments of the springs of the different valves applied to the body of chamber 9 are such that, until the depression caused by the running of the engine does not reach a given value p' inside the chamber 9, said valves remain closed, whilst when, owing to an increase in the engine speed said depression slightly surpasses said value p' , a first valve, e. g. the valve 11, will open (that the spring of said valve being adjusted so as come into operation only when the depression reaches the aforesaid value p' whilst the

other valves 12, 13 remain closed because their springs are adjusted to open at higher pressures p'' , p''' , respectively. If the engine runs more rapidly, the depression produced by the engine will increase, and reach such a point as to permit the successive opening of the other valves 12, 13, etc.

In such a way, relatively to the engine's acceleration, the quantity of air sucked in the chamber 9 increases in order to cause one or more inlets to open automatically. Simultaneously the quantity of petrol gases is controlled by means of the valve 6, thus assuring the desired proportion of the mixture being conducted to the engine. The different openings and valves are provided with suitable filters, not shown in the drawings.

Referring more particularly to the Figs. 4 and 5, 21 shows the flange connecting the device to the engine, at the point where the usual carburetters are placed. 22 shows the pipe of the carburetter, 23 the tank of the carburetter, 24 the usual connection of the petrol feed pipe to the carburetter; 25 is the small screw by means of which the air passage is regulated to the minimum value in relation to the minimum number of revolutions of the engine, 26 shows the lower outer part of the nozzle relating to the minimum number of revolutions; this part, is wing nut shaped (differing from the actual constructions, wherein a hexagonal head is placed which is not easily grasped with a spanner so that it is often necessary to dismantle the whole carburetter in order to replace or clean said nozzle), 27 is the driving shaft, of the valve 28; this shaft and valve have a special shape differing from the usual type, because the valve is formed of a simple oblong disc having two ribs 29 and 30 on the opposite faces, and at a given distance from the shaft, whilst the shaft 27 presents for all that portion corresponding to the vertical height of the valve, a split, wherein the disc 28 may be located, the two ribs being on either side of the shaft; by drawing away the shaft 27, in the direction of the arrow 31, the valve 28 becomes released and may be withdrawn.

Referring particularly to the embodiment adopted, to apply to a usual carburetter the parts necessary for carrying out the principles of the invention, it will be seen that the front opening 33 of the pipe 22 presents a stopping surface 34 and a successive threaded portion 35 on which is screwed a small head 7' provided with holes or openings 10, the dimensions of which correspond to the requirements of the engine to which the device is to be applied, and to its working conditions. On the small head 7' is also attached the connection 36 of a flexible pipe 37, the other end of which is connected with the upper end of a petrol tank 3; this tank according to the type of the engine, may be the petrol tank, or an auxiliary tank fed in

any way from the main petrol tank. It is only necessary and sufficient that the evaporating of the petrol in tank 3 and the space resulting above the petrol level in the tank, be of sufficient dimensions as to permit of the evaporation of the petrol with the required intensity for carrying out the system of the feeding of the engine.

The connection of the end 5 of the pipe 37 with the tank 3 will be effected preferably by the means shown in Fig. 3.

The pipe 5 is connected to the interior of a closed chamber 39 by means of a connection 38 similar to the aforementioned connection 36, which is fixed (for example by means of a bayonet coupling 40 and in 41) to the opening 42 of a connecting piece 43 (for example in substitution of the actual tap) mounted on a threaded portion 44 of the aforesaid tank 3. Any suitable packing 45 may be used for tightening the joint between the chamber 39 and the piece 43; this piece 43 carries a projection 46 which by means of the packing 47 causes a second interior chamber 44', provided with opening 45, to bind against a collar 48 of the member 43; the bottom of said chamber 44 is partially closed by a plate 46 fixed thereto in any way; said plate presents, along its edges, openings 47 which permit both the passage of the petrol gases in the direction of the arrows 48, and the transmission in opposite direction to the arrows 48 of the depression which is produced by the working of the engine and which passes along the conduit 37, the chamber 39, the openings 45 and 47.

The working of the complete device shown in Figs. 4 to 8 results from the superposition or sum of the working of a usual carburetter and of that of a device according to Figs. 1 to 3.

From the preceding statement it results that the device, either in the case in which it is (Figs. 1 to 3) destined to produce only a mixture of air and petrol gases, or in the case in which it is destined to help a usual carburetter by admitting said mixture into it produces a greater and better utilization of the petrol, because the device supplies totally or partially, an infinitely more intimate mixture of the vaporizing material and the air, this mixture causing a much better and more complete combustion of the petrol than the usual, provided as it is obtained by the aforesaid means the proportions of air and petrol are such as to obtain the complete combustion of the petrol gases. The thermal efficiency of the petrol used in such a way is substantially increased.

Although for descriptive reasons the present invention is based on what has been described and illustrated in the accompanying drawings, many practical changes may be made, such as by producing, in the case in which the device is designed for countries

with cold climates, special conditions of evaporation of the petrol (for instance by heating the petrol e. g. by means of the same products of the combustion) consequently permitting the petrol to develop a greater quantity of gases, provided all these modifications do not detract from the fundamental principles of the invention as set forth in the following claims.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:

1. A carburetting apparatus for internal combustion engines including in combination an air tight fuel tank, a pipe in communication with the space above the liquid level of the tank and connected to the engine so as to be subject to the suction of the engine to effect vaporization of the fuel, means at the tank end of the pipe for preventing entrance of liquid fuel particles, an air admission device branched from said pipe, and manually and automatically controlled valve devices respectively fitted to the pipe and to the air admission device.

2. A carburetting apparatus as claimed in claim 1, in which the air admission device is provided with a plurality of permanent inlet openings and with other inlet openings, and spring influenced valves controlling the said last mentioned openings.

3. A carburetting apparatus as claimed in claim 1, in which the air admission device is provided with a number of permanent inlet openings and with other openings, valves associated with the last mentioned openings, and the flexibility of the valves being arranged to allow the respective valves to open each under the influence of a greater suction than the previous one so as to admit a greater quantity of air with a greater number of revolutions of the engine.

4. A carburetting apparatus as claimed in claim 1, wherein a cap serves as a means for connecting the pipe to the tank, and wherein the means for preventing entrance of liquid fuel particles consists of a filter mounted in the cap.

5. A carburetting apparatus for internal combustion engines including in combination an air tight fuel tank, a pipe in communication with the space above the liquid level of the tank and connected to the engine so as to be subject to the suction thereof for effecting vaporization of the fuel, an air admission device interposed in said pipe, and manually controlled valve means for controlling the passage of mixture to the engine.

6. A carburetting apparatus for internal combustion engines including in combination an air tight fuel tank provided with a filling opening, a cap mounted on said opening, a filter mounted within the tank, an air admission device in communication with the

engine, a pipe connection between the cap and the air admission device, and valve means in the admission device for regulating the passage of mixture to the engine.

5 In testimony whereof we affix our signatures.

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