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AIR CARBURATION SYSTEM

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Fig. 1

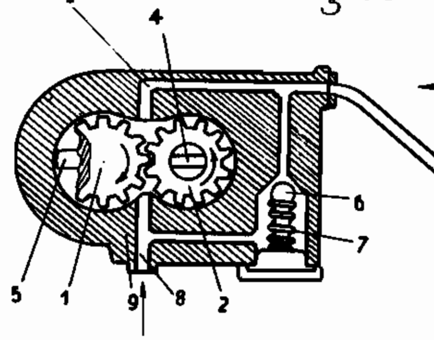


Fig. 6

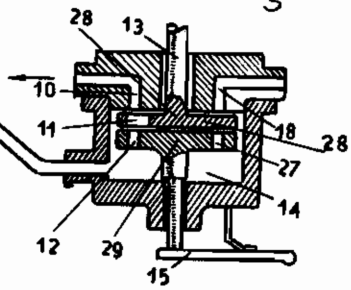


Fig. 7

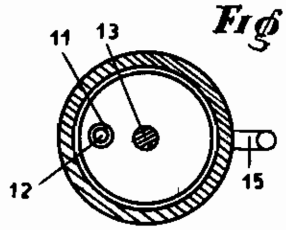


Fig. 2

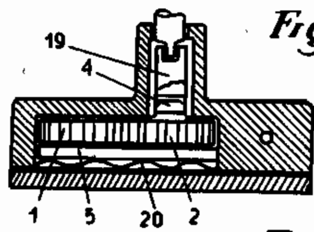


Fig. 3

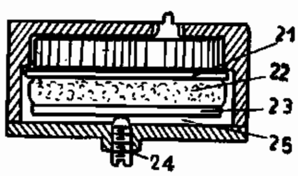


Fig. 8

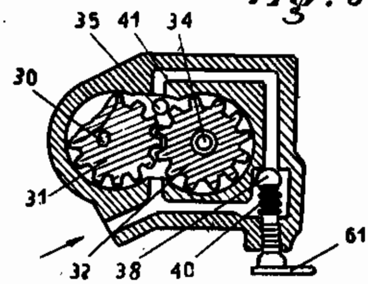


Fig. 4

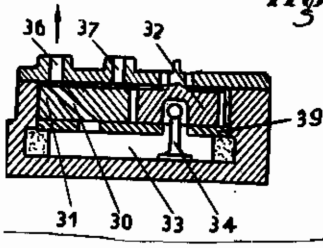


Fig. 9

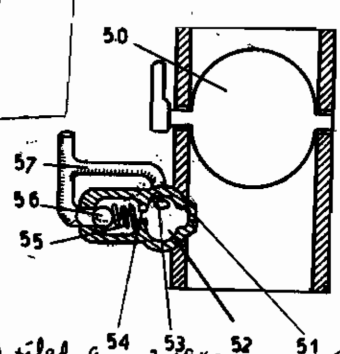
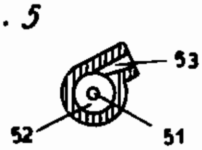


Fig. 5



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ALIEN PROPERTY CUSTODIAN

AIR CARBURATION SYSTEM

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This invention relates to an air carburation system and more particularly to a process that allows to obtain the carburation of the air that feeds the internal combustion engines. For this purpose, the use of a piston pump has also been proposed, but such a solution was very complicated. Furthermore, the quantity of fuel delivered to the engine being not constant, there has to be provided a pump for each cylinder of the engine. In order to avoid said difficulties, it is necessary to have a simple pump, capable of delivering, under mean pressures and in a constant and sure way, very small quantities of non-lubricating liquid. In this way, the use of the carburettor may be avoided.

The difficulty arising through the adoption of such a pump depends particularly on the use of a nonlubricating liquid. Then, if the pump is constructed with high watertightness, in order that the pump operation may be satisfactory, the clearances between the parts in movement are too small, and this results in an abnormal wear and easy seizing.

The main object of the invention is the application of a particular and very simple pump, as for inst. the so-called gear driven pump. Through the provision of two loose gearings and some other arrangements, this pump solves the problem. The liquid retaining zones between the parts in movement and the fixed parts must have resilient walls. In this way the desired tightness is obtained and wearing and seizing avoided. According to the invention, said resilient walls are obtained either by making use of the pressure that is provided by the pump itself and that forces the gearings against the casing, or by means of mobile segments or walls that push the gearings elastically upon their sides or flat faces.

A further object of the invention is the provision of such means as to enable the gearings to work without being forced with respect to their axes. It is therefore useful to provide a universal joint between the driving shaft and the driven gearing.

When such a pump is connected to an engine and adjusted for a good fuel dosage, it may feed the engine in a perfect way, either at full load or at any different number of revolutions. But when it is desired to reduce the motor torque, it is necessary to reduce the capacity of the pump and generally the sucked air quantity, in order to obtain a good combustion.

Another object of the invention is the provision of adapted means for regulating the quantity of fuel delivered at each revolution, and, if necessary, for sending the required fuel to the different cylinders. For this purpose, a distribution has been provided by means of rotating disks pressed against each other through the pressure of the liquid. One of the discs is arranged so as to regulate the fuel quantity to be sent to each cylinder through a simple angular displacement.

In order to obtain a fine spraying of the fuel, which has to be mixed with the air, an injector, the turbulent action of which may be regulated, is provided.

Other objects and advantages of the present invention will be more clearly understood from the following detailed description of some preferred embodiments of the invention, which are illustrated in the accompanying drawings, in which:

Fig. 1 is a cross-section of the pump.

Fig. 2 is a longitudinal section of the pump.

Fig. 3 is a longitudinal section of an alternative embodiment of the pump.

Fig. 4 is a longitudinal section of another constructive form.

Fig. 5 is a longitudinal section of a spray nozzle.

Fig. 6 is a longitudinal section of a spraying system.

Fig. 7 is a cross-section of the spraying system shown in Fig. 6.

Fig. 8 is a cross-section of a further alternative embodiment.

Fig. 9 is a cross-section of the same spray nozzle.

The pump (Figs. 1 and 2) has to be driven by the engine which it feeds. This pump consists of a couple of toothed wheels 1 and 2. These wheels rotate within the body of the pump 9, pushing the fuel towards the pipe 3. These two toothed gearings are completely free in their chambers. They have but to be urged to rotate. For this purpose the toothed gearing 2 driving the toothed gearing 1, is moved by its driving shaft 19 through a universal joint 4. As said before, the two toothed gearings 1 and 2 send the liquid through their movements into the pipe 3. In this way a pressure is created. This pressure makes adhere the peripheric surface of the teeth to the chamber walls, creating in this way a good tightness. In order to obtain the tightness upon the two lateral surfaces, a segment 5 is placed along the whole length of the gearing chamber. This segment is biased by the spring 20, so as to adhere to the side of the toothed gearings with a suitable pressure and assuring in this way a resilient tightness upon the sides of the gearings. A ball valve 6 is pushed on its seats by a spring 7. When the pressure reaches a predetermined value, the liquid returns towards the suction side of the pump.

The embodiment shown in Fig. 3 has the whole of the lower surface of the pump chamber movable and pushed against the lower flat surface of the gearings 1 and 2. The sheet 21 forming the lower surface of said chamber is adjacent to a suitable resilient layer 22 of cork or any other suitable material. Said layer is supported by the supporting member 23. This supporting member 23 is suitably pushed towards the gearings through the screw 24.

The sheet 21 is a Bakelite or fibre sheet, as these materials have the property of allowing rather high pressures, without fear of an excessive wear; this is of particular importance, when the gearings are hardened steel gearings, said hardened steel being extremely hard. When the pump is working, the pressure of the pump overcomes the pressure applied by the cork 22 upon the Bakelite sheet 21. But when the chamber 25 is closed and in communication with the pump chamber, in which enters the liquid, a counterpressure is established immediately, and the wall 21 will adhere again to the toothed wheels.

Now, it may be that it is necessary to feed separately the cylinders. In this case it is necessary to provide that the pump may subdivide and dose the liquid suitably. Figs. 6 and 7 show an arrangement suitable for such a purpose. The shaft 13 drives the rotation of the disk 28, which is provided with a hole 11. This shaft 13 is coupled with the engine shaft through a suitable speed reduction, an arrangement according to the number of engine cylinders. The disk 28 is preferably of Bakelite. Towards this disk is placed the disk 29 provided with a series of holes, such as 12 and 27. This disk may be angularly adjusted by means of the lever 15. Pipes, such as 10 and 18 are provided in a fixed member connected with the pipes feeding the engine cylinders. Through these pipes the liquid leaves, in order to enter the different cylinders. The axes of these pipes are generally in alignment with the axes of the holes 12 and 27. In the chamber 14 the liquid arrives under pressure and forces the disks 28 and 29 upwards, in order to reach the desired tightness. When the disc 29, provided but with the opening 11, rotates, it uncovers successively each inlet of the feeding pipes 10—18. These pipes feed the liquid to the cylinders, as it has been seen before. In this way it is possible to dose separately the liquid feeding the different engine cylinders. Rotating the lever 15, it is possible further to reduce the quantity of liquid, as by said adjustment the time of the opening of each pipe is reduced. In fact, as long as the axis of the pipe 10 is in alignment with the axis of the hole 12, the opening and the closing of said holes coincide. If, however, the hole 12 is displaced with respect to the pipe 10, there will be a delay in the opening of the passage from the chamber 14 to the pipe 10 or an anticipation in the closing of the same passage, according to the sense of the movement. In this way is obtained a regulation of the feeding time, and in consequence of the quantity of liquid that will be fed to the cylinders.

Figs. 4 and 8 show some improvements of the embodiments shown in the other figures. The tightness between the tooth ends and the chamber walls may be improved through a resilient system. Besides the pressure of the liquid, this resilient system aids said teeth to adhere to the chamber walls. For this purpose, the toothed wheel 32, which is seen in cross-section, has a central hole, and a resilient rod 34 aids to push said toothed wheel in the sense determined by the pressure.

In order to avoid the complication of a separate spraying nozzle, the toothed wheel 31 may be arranged in such a way as to cause the desired fuel distribution, and the separate distributor may be entirely dispensed with. In fact, the pump pushes the liquid into the chamber 33 (Fig. 4) through the holes 35 (Fig. 8). After having forced the wall formed by the sheet 39, assuring in this way the desired tightness, the liquid passes through the oblique pipe 30 provided in the toothed wheel 31. The number of revolutions of the toothed wheel 31 is in a suitable ratio with the engine revolutions, so as to deliver to the pipes 36 and 37 and then to the different cylinders the desired fuel quantity. In this way, the desired spraying is obtained. For the regulation of the fuel quantity delivered to the cylinders, it is necessary to provide the following arrangement. Through the pipe 41 the liquid arrives at the valve 38. This valve governs the pressure according to the tension that is given to the spring 40. Said device is provided with a lever 61, adapted to adjust the tension of the spring 40, in order to obtain the desired pressure, as, when the predetermined pressure is overdrawn, the excedent liquid will return through the pipe towards the suction side of the pump. Governing in this way the delivery pressure, it is possible to regulate the discharge speed, and in consequence the quantity of liquid feeding the engine.

Fig. 9 shows the spray nozzle applied to the air suction tube. Fig. 5 shows the turbulence chamber. The tube 57 receives the liquid under pressure from the pump. Through a branched duct the liquid is fed to the valve 58, the action of which is regulated through the spring 55. The other branched duct feeds the liquid to the hole 53, and said liquid will flow tangentially into the chamber 52.

The whole arrangement works as follows: The liquid that enters the chamber 52, starts rotating very quickly, before it can leave through the hole 51. Through this rotation it is pulverised immediately, and this rotation continues until the centrifugal force causes such a pressure at the outlet of the hole 53 that the liquid, necessarily under pressure in the whole pipe, has the force to open the valve 56. A part of the liquid enters then the chamber 52, through the hole 54, and is mixed with the other part, provided with a rotatory movement. There is obtained herewith a diminution in the centrifugal action, without, however, obtaining a less good pulverisation, because, the speed of leaving being high, this speed itself aids to obtain the pulverisation. In this way, considerably greater holes may be provided, and the high pressures are therefore avoided, having all the same a good pulverisation.

When the quantity of fuel per revolution is reduced, the quantity of air to be admitted to the engine has generally to be regulated also. For this purpose, the flap valve 50 is to be provided, upon the pipe that feeds the carburetted air to the engine. This flap valve 50 may, for inst., be connected to the lever 61, Fig. 8, in order to obtain the desired regulation.

Since certain changes may be made in the above embodiments of the invention, without departing from its spirit, it is intended that all the matter contained in the above description or shown in the accompanying drawings, shall be considered as illustrative, and not in a limiting sense.

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