Dec. 13, 1932. F. BAVEREY 1,890,567

INTERNAL COMBUSTION ENGINE FEEDING ARRANGEMENT

Filed Dec. 30, 1927

Fig. 1

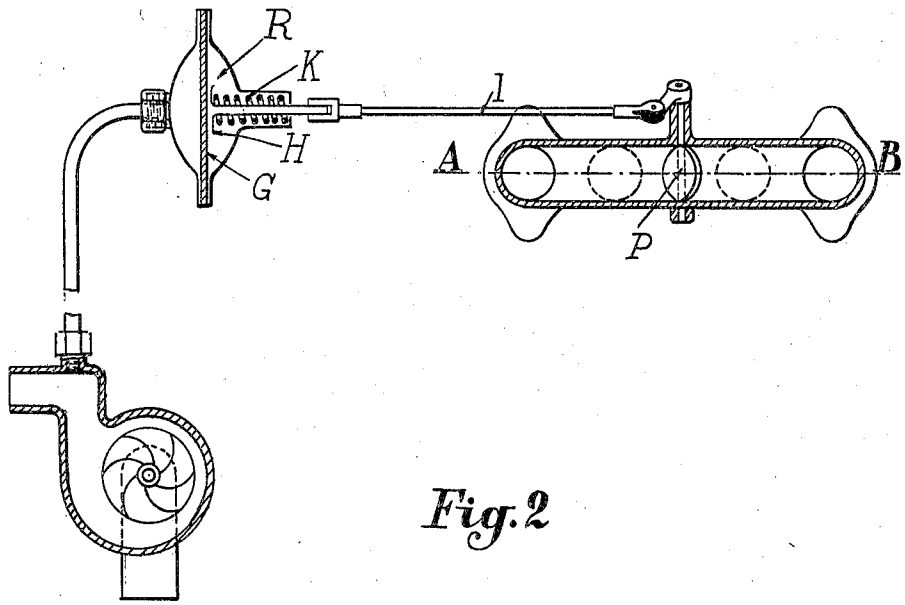
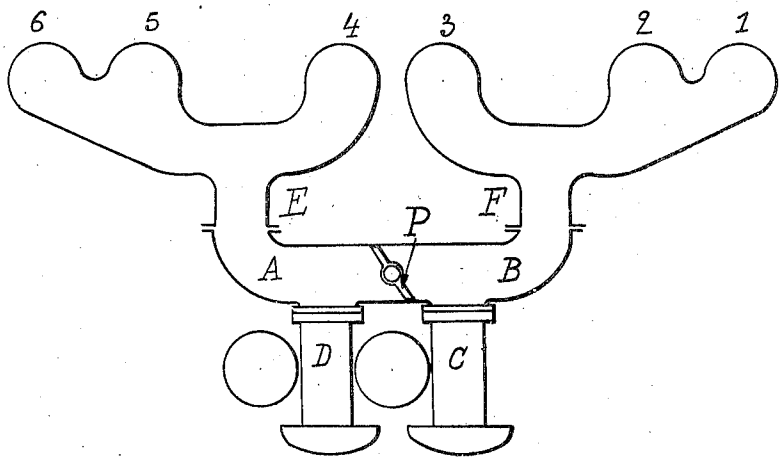


Fig. 2



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UNITED STATES PATENT OFFICE

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INTERNAL COMBUSTION ENGINE FEEDING ARRANGEMENT

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The present invention relates to a feeding arrangement for internal combustion engine provided with several carbureters adapted to feed several sets of cylinders respectively.

It is the current practice to supply the cylinders of engines, of the multiple cylinder type, in groups of two, three or four cylinders, by separate carbureters, so that the admission or operative periods for a given carbureter will be spaced at equal intervals of time.

For example, in an engine having six cylinders which is provided with two carbureters, as shown in the appended drawing, one carbureter is adapted to supply the cylinders 1—2—3 and the second carbureter is adapted to supply the cylinders 4—5—6; since the sequence of the explosions corresponds to the succession of cylinders in the order 1—5—3—6—2—4, the spacing of the periods of admission for the cylinders 1—2—3 will correspond to an angle of 240° in the rotation of the crankshaft, assuming that the angular spacing of the crankpins is 120°, and that the order of explosions is, as stated, 1—5—3—6—2—4.

Theoretically, there will be between each admission and the next an interval corresponding to a rotation through 60° of the crankshaft in which no gas will be admitted, and this in each group of three cylinders. The carbureter corresponding to each group of cylinders will thus be subjected to periodical suction periods, alternating with periods in which there is no suction.

The invention has for its object to improve the feeding or filling of the cylinders with the fuel mixture at high speeds, in order to increase the driving torque during such periods, this being obtained by a reduction of the loss of head in the carbureter.

The invention has also for its object to provide automatic means for connecting one carbureter corresponding to one group of cylinders with another group of cylinders, at high speeds of the engine, in such manner that the cylinders of both groups will be simultaneously supplied by the two carbureters, thus insuring a more complete filling of the cylinders and an increase in the power torque.

The invention has also for its object to provide means for controlling the connection between the carbureters and cylinders at high speeds in such manner that each carbureter will be automatically connected with the several groups of cylinders during such periods, but will remain connected with one single group of cylinders at slow running and at reduced speeds of the engine.

It will be observed that the above mentioned arrangements will automatically afford an increase in the cross-section of the diffusers of each carbureter, since at high speed the adjacent carbureter is caused to operate during the periods in which no suction would otherwise take place, that is during the periods of suction of the carbureter actually corresponding to the set of cylinders considered.

In the appended drawing:

Fig. 1 is a diagrammatic cross section of the intake manifold and automatic control means for the feeding.

Fig. 2 is a diagrammatic side view of the intake manifold and carbureters.

In the constructional form which is shown in the appended drawing, the intake manifold comprises two branches E, F connected with the respective groups of cylinders 1, 2, 3—4, 5, 6 and a common intake conduit A, B. Two carbureters C and D open into the said conduit, carbureter C being adapted to feed the cylinder group 1—2—3 and carbureter D being adapted to feed the group 4—5—6.

At the middle part of conduit A B is disposed a throttle P which is controlled—through the medium of any suitable mechanism—either by hand or by automatic means responsive to changes in the engine speed such as a hydraulic governor R which is responsive to the pressure of the cooling water in the cooling circuit of the engine. The governor R may consist of a tight casing divided into two chambers by an elastic membrane G one side whereof is subjected to the pressure of the cooling water by means of a pipe branched from the water pump the latter being driven at a speed proportional to the engine speed. The other side of the said membrane engages the flat end of a plunger H connected with a link I; a return spring K is adapted to urge

the said plunger toward the inoperative position, and provides for the adjustment of the apparatus. A mechanically operated governor may obviously be substituted for the one above described.

The operation of the above arrangement is as follows:

When the engine is running at slow speed, the throttle P is closed and the two groups of cylinders 1—2—3 and 4—5—6 are separately supplied by the respective carbureters C and D. When the engine speed increases, the output of the water pump is correspondingly increased, thus raising the water pressure acting on the membrane G. For a predetermined speed, to which corresponds a given pressure of the cooling water, spring K will be compressed, and the throttle P will be largely opened, thus connecting together the two branches A and B of the conduit, and the intake manifolds of the two groups of cylinders 1—2—3 and 4—5—6 will hence be supplied by both carbureters C—D which will mutually assist one another in feeding the cylinders by delivering a supplementary amount of fuel mixture in order to compensate for the periods in which the suction is more active upon one than on the other.

This will provide for a substantially continuous admission of air into the carbureters, and a more complete filling of all the engine cylinders, due to the reduction in the loss of head in the diffusers of the carbureters. The power torque is obviously increased according as the cylinders are more completely filled.

I am aware that it has already been proposed in connection with internal combustion engines having several carbureters adapted to feed several sets of cylinders respectively to provide within the intake manifold common to the various sets a throttle adapted to substantially obturate said intake manifold between two adjacent carbureters, and to operate said valve by means responsive to the atmospheric pressure so that the valve is opened when the atmospheric pressure falls or by means such that opening and closing of the valve takes place simultaneously with opening and closing the throttle valve of the carbureter. I therefore do not broadly claim such a combination but what I claim as new and desire to secure by Letters Patent is:

1. In a water cooled internal combustion engine having a pump, driven by the engine, for circulating the cooling water and an intake manifold common to several cylinders and at least two carbureters connected to said intake manifold, a throttling member in said intake manifold between said carbureters, a deformable member adapted to be deformed in proportion to the water pressure in the cooling water circuit of the engine, and means for connecting said deformable member to said throttling member.

2. In an internal combustion engine having several groups of at least one cylinder, one carbureter for each cylinder group, communicating means between each carbureter and its corresponding cylinder group whereby each cylinder group may be fed by its corresponding carbureter independently of the other cylinder groups and carbureters, an intake manifold connecting said communicating means together, means inserted in said intake manifold between each two successive communicating means and adapted to substantially obturate said intake manifold, and means responsive to change in the engine speed to control said obturating means in such manner that the latter will open only when the engine is speeded up beyond a predetermined limit.

3. In an internal combustion engine having several groups of at least one cylinder, one carbureter for each cylinder group, communicating means between each carbureter and its corresponding cylinder group whereby each cylinder group may be fed by its corresponding carbureter independently of the other cylinder groups and carbureters, an intake manifold connecting said communicating means together, means inserted in said intake manifold between each two successive communicating means and adapted to substantially obturate said intake manifold, actuating means permanently tending to close said obturating means and means responsive to the engine speed to operate said obturating means in antagonism to said actuating means, whereby said obturating means will open only when the engine is speeded up beyond a predetermined limit.

In testimony whereof I have signed my name to this specification.

FRANÇOIS BAVEREY.