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INTERNAL COMBUSTION ENGINE

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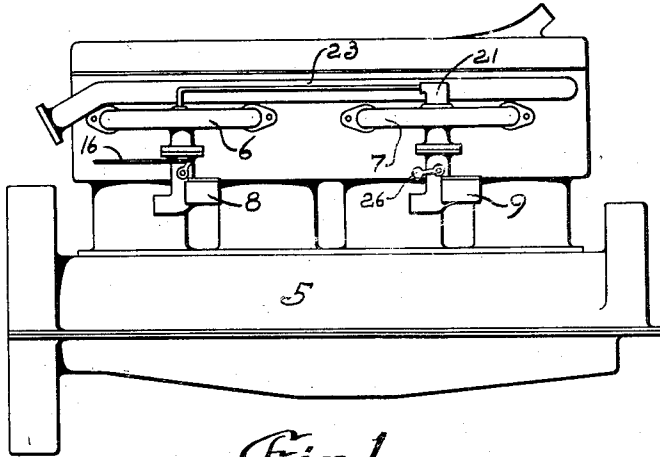


Fig. 1.

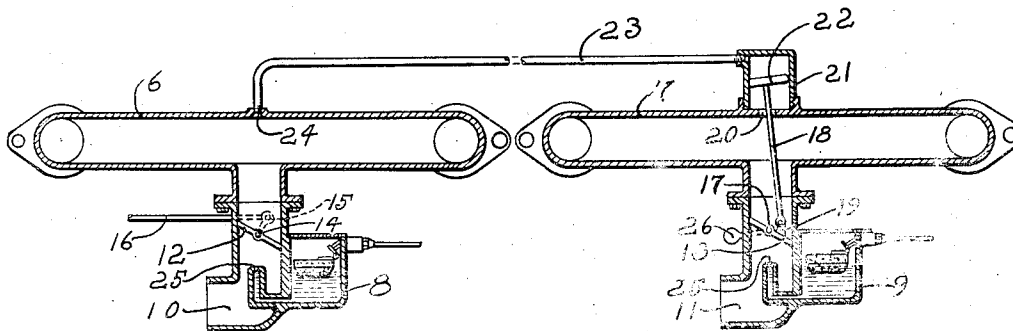


Fig. 2.

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INTERNAL COMBUSTION ENGINE

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My invention relates to internal combustion engines, more particularly of the type wherein a large number of cylinders are employed. It is frequently desirable, in engines of this type, to use more than one carburetor, each carburetor having its own intake manifold and each manifold serving a different group of cylinders.

One of the primary objects of my invention is to provide means whereby a manually operable control for one manifold or carburetor may be provided together with means whereby the other carburetors or manifolds will be automatically operated with a predetermined ratio to the first mentioned manifold or carburetor.

More specifically, my invention is directed to the employment of manually operable means controlling the throttle valve of one manifold together with means connected with such manifold whereby the remaining throttle valves for the other manifolds may be controlled in accordance with the pressures produced in the first mentioned manifold.

It will be readily discernible that my invention may be applied to internal combustion engines having any number of separate manifolds and carburetors although for the purpose of illustration I have herein shown only two.

With the above and other objects in view, my invention consists in the arrangement, combination and construction of the various parts of my improved device, as described in the specification, claimed in my claims and shown in the accompanying drawing, in which:

Fig. 1 is a side elevation of an internal combustion engine showing the application of my invention.

Fig. 2 is a central sectional view showing more or less diagrammatically the application of my invention to a pair of separated manifolds and carburetors.

The internal combustion engine which I have illustrated is generally indicated as 5 and may comprise any number of cylinders. I have shown applied thereto a pair of separated intake manifolds 6 and 7, the same having carburetors 8 and 9, respectively. The

manifolds have the conventional air inlet openings 10 and 11 and throttle control valves 12 and 13. The valve 12 is pivoted as at 14 and is adapted to be manually operated by the lever 15 and rod 16. The rod 16 extends to the conventional accelerator pedal. The throttle valve 13 is pivoted as at 17 and is adapted to be operated by the rod 18 which is connected thereto as at 19. The rod 18 extends through the body of the manifold 7 and the aperture 20 in the top thereof to the chamber 21 which is secured thereto. Within the chamber 21 the rod is provided with a piston head 22. The top of the chamber 21 is provided with an opening into which one end of a pipe 23 extends. The other end of the pipe 23 leads to and connects with the manifold 6 through the opening 24.

It will be readily understood by those skilled in the art that the manifolds 6 and 7 are connected with the various cylinders of the engine, each manifold serving a different group of cylinders. It will also be understood that the operation of the cylinders tends to pull a vacuum or bring about a reduced pressure in the manifolds so that the gasoline from the carburetors may be drawn through the conventional openings 25 into the manifolds where it is mixed with the incoming air to provide a combustible mixture. The amount of incoming mixture is varied by the regulation of the throttle valves 12 and 13 and it is desirable that the mixture passing through each of the manifolds shall be substantially the same.

The pressure in the manifold 6, and correspondingly the amount of mixture passing therethrough, will be regulated by the operator of the engine by manual operation of the rod 16. By reason of the connection through the pipe 23 of the manifold 6 with the chamber 21, the lowered pressure in the manifold 6 will act to raise the piston head 22 in the chamber 21 so as to close the valve 13 in direct proportion to the opening and closing of the valve 12. The suction of the manifold 6 upon the piston head 22 will, of course, be resisted by the suction in the manifold 7 so that the head will float in the chamber 21 at a point where the pressures of the manifolds

will balance, thereby bringing about a regulation of the pressure in the manifold 7 in an exact predetermined ratio to the pressure in the manifold 6.

5 It is of course necessary that the pressures in the manifolds 6 and 7 shall be substantially the same. The weight of the piston head 22 and rod 18 normally tends to open the valve 13 a little more than the valve 12. This, how-
10 ever, may be compensated for by the provision on the valve 13 of a counter-weight 26.

It will be readily apparent that my invention is susceptible of many changes without departing from the spirit thereof. The particular means for bringing about the equalization of pressures in the two manifolds is
15 by no means limited to the one herein disclosed inasmuch as various other well known devices may be used with equal success. A flexible diaphragm might be substituted for
20 the piston head 22. Likewise a spring might be substituted for the counterweight 26 in order to normally equalize the valve 13 with the valve 12.

25 It will be obvious that various changes may be made in the arrangement, combination and construction of the various parts of my improved device without departing from the spirit of my invention and it is my intention
30 to cover by my claims such changes as may reasonably be included within the scope thereof.

What I claim is:

1. An internal combustion engine having a
35 plurality of intake manifolds, means for delivering a combustible fuel mixture thereto, means for regulating the pressure in one manifold and movable means, controlled by the pressure in said manifold, for regulating the
40 pressure in another of said manifolds.

2. An internal combustion engine having a plurality of intake manifolds, means for delivering a combustible fuel mixture thereto, means for regulating the pressure in one
45 manifold and movable means, controlled by the pressure in said manifold, for maintaining the pressure in another of said manifolds at substantially the same pressure as the first.

3. An internal combustion engine having a
50 plurality of intake manifolds, means for delivering a combustible fuel mixture thereto, means for regulating the pressure in one manifold and means, controlled by the pressure in said manifold, for maintaining the pressure
55 in another of said manifolds at a predetermined relation to the pressure in the first.

4. An internal combustion engine having a plurality of intake manifolds, means for delivering a combustible fuel mixture thereto,
60 means for regulating the pressure in one manifold and oscillative means at least partially controlled by the pressure in said manifold for regulating the pressure in another of said manifolds.

65 5. An internal combustion engine having a

plurality of intake manifolds, means for delivering a combustible fuel mixture thereto, means for regulating the pressure in one manifold and oscillative means at least partially controlled by the pressure in said manifold
70 for maintaining the pressure in another of said manifolds at substantially the same pressure as the first.

6. An internal combustion engine having a plurality of intake manifolds, means for delivering a combustible fuel mixture thereto,
75 means for regulating the pressure in one manifold and oscillative means at least partially controlled by the pressure in said manifold for maintaining the pressure in another of
80 said manifolds at a pre-determined relation to the pressure in the first.

7. An internal combustion engine having a plurality of manifolds, means for delivering a combustible fuel mixture thereto, each manifold being provided with a throttle
85 valve, manual means for controlling one throttle valve and means controlled by the pressure in the manifold carrying said valve for controlling the throttle valve of another
90 of said manifolds.

8. An internal combustion engine having a plurality of manifolds, means for delivering a combustible fuel mixture thereto, each manifold being provided with a throttle valve,
95 manual means for controlling one throttle valve and means controlled by the pressure in the manifold carrying said valve for maintaining the pressure in another of said manifolds at substantially the same pressure as
100 the first.

9. An internal combustion engine having a plurality of manifolds, means for delivering a combustible fuel mixture thereto, each manifold being provided with a throttle
105 valve, manual means for controlling one throttle valve and means controlled by the pressure in the manifold carrying said valve for maintaining the pressure in another of said manifolds at a predetermined relation
110 to the pressure in the first.

10. An internal combustion engine having a plurality of manifolds, means for delivering a combustible fuel mixture thereto, each manifold being provided with a throttle
115 valve, manual means for controlling one throttle valve and oscillative means connected with a throttle valve of another manifold and at least partially controlled by the pressure in the first manifold for regulating the
120 pressure in the said other manifold.

11. An internal combustion engine having a plurality of manifolds, means for delivering a combustible fuel mixture thereto, each manifold being provided with a throttle
125 valve, manual means for controlling one throttle valve, oscillative means open to pressures from said manifold and at least one other manifold and connected to the throttle valve of such other manifold, whereby the

pressures of the said manifolds may be maintained at substantially constant ratios to each other.

12. The combination with a pair of internal combustion engine fuel supply systems, of a movable member subjected on one side to the fluidic pressure existing in one of said systems and on its opposite side to the fluidic pressure existing in the other of said systems, a throttle valve for one of said systems, and means operatively connecting said throttle valve with said member.

13. The combination with a pair of internal combustion engine fuel supply systems, of a movable member subjected on one side to the fluidic pressure existing in one of said systems and on its opposite side to the fluidic pressure existing in the other of said systems, a throttle valve for one of said systems operatively connected to said member, and a manually controlled throttle valve for the other of said systems.

14. The combination with a pair of internal combustion engines having separate fuel supply systems, of a movable member subjected on one side to the fluidic pressure existing in the fuel supply system of one of said engines and on its opposite side to the fluidic pressure existing in the fuel supply system of the other of said engines, a throttle valve for the fuel supply system of one of said engines, and means operatively connecting said throttle valve with said member.

15. In combination with a plurality of internal combustion engine cylinders, intake manifolding means for said cylinders including a separate intake passage for each of said cylinders, means for supplying a charge of combustible mixture to each of said passages, movable means associated with one of said passages for controlling the flow of said combustible mixture thereto, and means automatically actuated by variations induced in said one passage by movement of said control means for effecting similar variations in the remainder of said passages.

16. In combination with a plurality of internal combustion engine cylinders, intake manifolding means for said cylinders including a separate intake passage for each of said cylinders, means for supplying a charge of combustible mixture to each of said passages, a throttle valve for one of said passages, throttling means for the remainder of said passages, and means induced by conditions varied in said one passage upon movement of said throttle valve for automatically effecting similar variations in said remainder of said passages through movement of said throttling means.

17. In combination with a plurality of internal combustion engine cylinders, intake manifolding means for said cylinders including a separate intake passage for each of said cylinders, means for supplying a charge of

combustible mixture to each of said passages, a throttle valve for one of said passages, a throttle valve for each of the other of said passages, and means automatically actuated by pressure variations induced in said one passage upon movement of said throttle valve therefor for effecting similar pressure variations in the remainder of said passages by movement of the throttle valves therefor.

18. In combination with a pair of internal combustion engine cylinders, intake manifolding for said cylinders including a separate intake passage for each of said cylinders, means for supplying a combustible fuel mixture to said passages, a throttle valve for one of said passages, throttling means for the other of said passages, and means automatically actuated by pressure variations induced in said one of said passages upon movement of said throttle valve for effecting similar pressure variations in the other of said cylinders by movement of said throttling means.

19. In combination with a pair of internal combustion engine cylinders, intake manifolding for said cylinders including a separate intake passage for each of said cylinders, means for supplying a combustible fuel mixture to said passages, a throttle valve for one of said passages, throttling means for the other of said passages, and means automatically actuated by pressure variations induced in said one of said passages upon movement of said throttle valve for effecting similar pressure variations in the other of said cylinders by movement of said throttling means, comprising a wall movable in response to variations in pressure in said one passage, and an operative connection between said wall and said throttling means.

20. In combination with a pair of internal combustion engine cylinders, intake manifolding for said cylinders including a separate intake passage for each of said cylinders, means for supplying a combustible fuel mixture to said passages, a throttle valve for one of said passages, throttling means for the other of said passages, and means automatically actuated by pressure variations induced in said one of said passages upon movement of said throttle valve for effecting similar pressure variations in the other of said cylinders by movement of said throttling means, comprising a cylinder connected at one end to said one passage and at its opposite end to said other passage, a piston in said cylinder, and an operative connection between said piston and said throttling means.

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