May 16, 1933. L. M. WOOLSON 1,909,032

INTERNAL COMBUSTION ENGINE

Filed Sept. 25, 1926 2 Sheets-Sheet 1

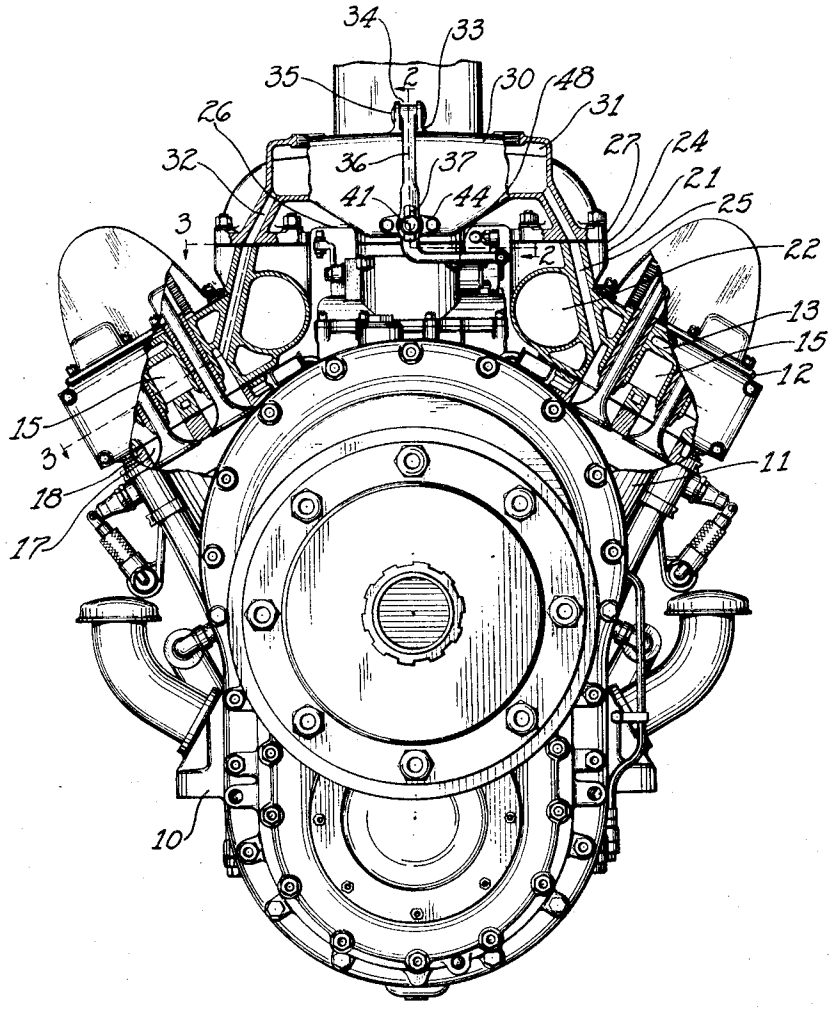


FIG. 1

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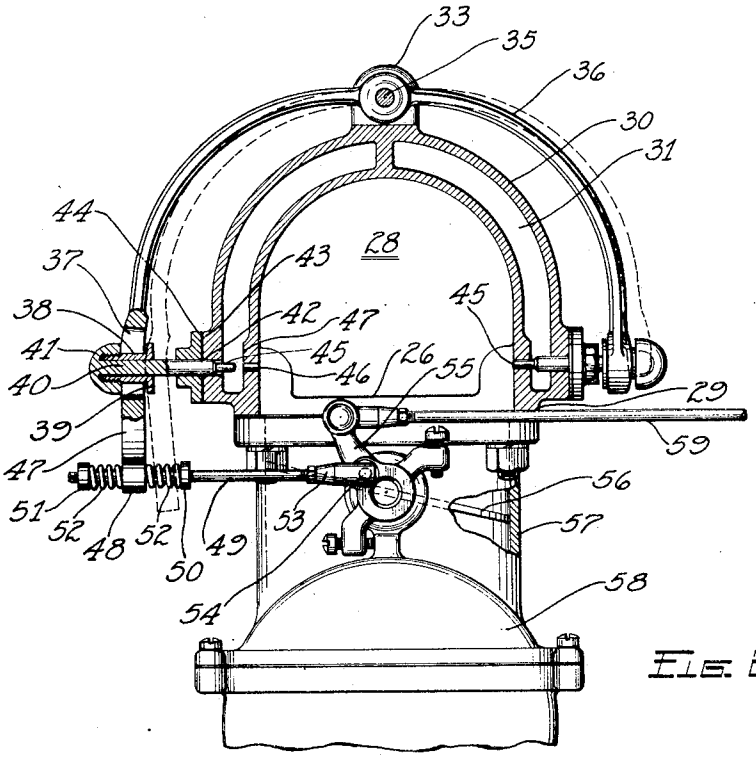


Fig. 2

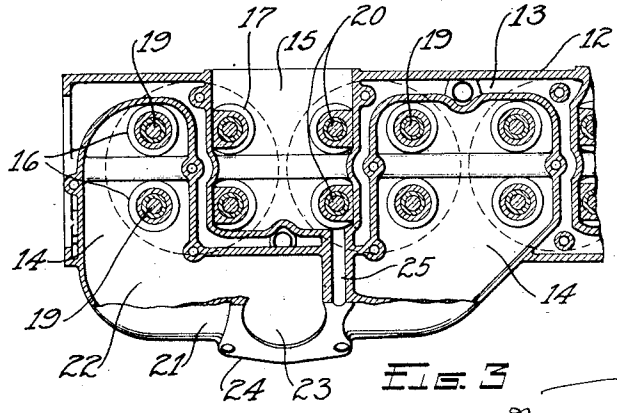


Fig. 3

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UNITED STATES PATENT OFFICE

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INTERNAL COMBUSTION ENGINE

Application filed September 25, 1926. Serial No. 137,648.

This invention relates to internal combustion engines and more particularly to the structure of the intake and exhaust passages and means associated therewith for heating fuel or mixture.

An object of the invention is to provide means for supplying exhaust heat to the incoming mixture of an internal combustion engine and to insure the passage of a portion of the exhaust gases to the intake passage.

Another object of the invention is to provide a valve housing having intake and exhaust chambers and an intake manifold with a heating chamber associated therewith and having a direct communication with the intake chambers, the manifold having in its wall a passage providing a direct connection between the exhaust chambers and the heating chamber.

Another object of the invention is to provide a jacketed intake manifold with pairs of communicating ports adapted to be opened and closed concomitantly with the operation of the engine.

Another object of the invention is to provide a jacket intake manifold having a pair of ports between the jacket and the intake passage adapted to be alternately engaged one at a time by reciprocating plungers actuated concomitantly with the actuation of a control element of the engine.

With these and other objects in view which may be incident to my improvements, the invention consists in the parts and combinations to be hereinafter set forth and claimed, with the understanding that the several necessary elements comprising my invention, may be varied in construction, proportion and arrangement, without departing from the spirit and scope of the appended claims.

In the drawings forming a part of this specification:

Fig. 1 is a front elevation of a V-type motor partly in section illustrating my invention as applied,

Fig. 2 is a detail view partly in section and partly in side elevation, the part in section being taken substantially on line 2—2 Fig. 1. The rocking arm for actuating the plungers is shown in two positions one of which is in dotted lines, and

Fig. 3 is a sectional view taken on the line 3—3 Fig. 1, the same being partly broken away to avoid duplication.

Referring by numerals to the drawings, 10 represents a motor crank case having mounted thereupon cylinders 11. There are six or more of these cylinders arranged in pairs in accordance with the usual structure of the V-type motor. Mounted upon each of the alined rows of cylinders is a valve housing 12. The valve housing 12 is formed with a water jacket as indicated at 13 and intake and exhaust chambers 14 and 15. The intake and exhaust chambers communicate with intake and exhaust ports 16 and 17 in the heads 18 of the cylinders 11. The ports 16 and 17 have seated therein intake and exhaust valves 19 and 20, mounted in the housing 12 and provided with suitable actuating means as clearly as shown in Fig. 1.

The housings 12 have shouldered portions 21 in which are formed passages 22 communicating with the intake chambers 14. These shouldered portions extend from the housings 12 at an incline thereto and perpendicular with respect to the motor and are provided with openings 23 communicating with the passages therein. Surrounding the openings 23 are flanges 24, the faces of which are in a horizontal plane with respect to the motor.

The general contour of the shouldered portions 21 is such that the passages therein are substantially direct communications with the intake chambers. The advanages of such structure are apparent, since it is well established that the passage from the mixing chamber of a carburetor to the intake chamber of a cylinder should be as direct as possible to obtain the best results.

Formed in the wall of the housing 12 and the shouldered portions 21 is a passage 25 having a direct communication from the face of the flange 24 to the exhaust chambers 15, and slightly inclined from the vertical plane of the motor. It is therefore,

in a direct line of communication with the top of the exhaust chamber and since the passage 25 is formed in and is a part of the wall of the intake passage 22 it naturally follows that heat imparted to the wall of the passage 25 by the discharge gases is transferred to the intake passage 22 and is absorbed by the incoming gases, the desirability of which is well known in the art.

The valve housings 12 are in pairs and are alike in all essential particulars except of course the shouldered portions 21 are on the right hand side of the left hand housing and on the left hand side of the right hand housing. It therefore follows that the shouldered portions on the right and left hand housings are oppositely disposed with respect to each other and that their respective flanges are also oppositely disposed. Since the shoulders on both housings are inclined therefrom at the same angle or degree, the flanges 24 formed on the respective shoulders are oppositely disposed and in the same horizontal plane.

Mounted upon the flanges 24 transversely disposed with respect to the motor is a manifold comprising a substantially flat portion 26 connecting alike flange portions 27 which are bolted upon the flanges 24. Formed integral with the oblong portion 26 is a wall, semi-circular in cross section and curved at its ends to meet the flanges 24, to provide a passage 28 communicating with the oppositely disposed intake passages 22 and having a central opening in its bottom or flat portion 26 surrounded by a flange 29 to which is bolted a carburetor.

The manifold is provided with a jacket 30, forming a saddle over the complete manifold except a small portion at each end thereof. The jacket is spaced from the semi-circular wall to provide a uniform space 31 between the wall of the jacket and the wall of the manifold. Formed in and as a part of the semi-circular wall at each end of the manifold is a passage 32. The passages 32 communicate with the space 31 formed between the jacket and the manifold and have a direct connection with the passages 25 in the shouldered portions leading from the exhaust chambers, hence, the jacket has a continuous supply of hot gases direct from the exhaust chambers.

Centrally disposed upon the wall of the jacket 30 is a boss 33 which is slotted as indicated at 34. Pivotally mounted in the slot 34 by a pin or bolt 35 is a semi-circular arm 36 mounted to straddle the jacket 30. The arm 36 is provided with slotted portions 37 in each of which is mounted a sleeve 38 having a flange 39 upon one end adapted to engage the arm on each side of the slot and threaded upon the other end. A pin 40 is mounted in each of the sleeves 38. The pin 40 has a flanged head 41 internally threaded to engage the threads upon the sleeve and is adapted to bear upon the arm on each side of the slot oppositely disposed to the flange 39 on the sleeve 38.

The pins 40 are mounted to reciprocate in bores 42 drilled through the bosses 43 and the wall of the jacket 30 on which the bosses 43 are found. Flanged sleeves 44 are bolted to the boss 43 to provide suitable brackets or supports for the pins. These pins are provided upon their free ends with plungers 45 adapted to engage bores 46 drilled through the bosses 47 and the wall of the manifold upon which the bosses 47 are formed. The bores 42 and 46 are in axial alinement, thus by rocking the arm 36 the plungers are caused to reciprocate into and out of the bores 46 to keep the same free and clear of any stoppage, caused by the exhaust gases. The bores 46 are the only open communications between the jacket and the manifold and these ports are so located as to admit hot exhaust gases to the incoming mixture immediately upon the incoming gases entering the manifold.

In order to rock the arm 36 to impart a reciprocating movement to the pins 40 and hence the plungers 45, the arm is provided with a prolongation 47 bent at right angles to provide an arm 48. The arm 48 is apertured to receive a rod 49. One end of the rod is provided with an abutment 50 and a tap 51 between which the apertured end of the arm 48 is mounted with coiled springs 52 interposed. The other end of the rod 49 is threaded to receive a socket 53 engaging a ball stud 54 mounted upon a lever 55 for actuating the throttle valve 56 in the mixing chamber 57 of a carburetor 58 bolted to the flange 29 on the manifold. The lever 55 is connected by a rod 59 and suitable linkage to a control element not shown.

It is to be observed that the valve housings are at an incline to the vertical plane of the motor and that the shouldered portions extend tangentially to the housings and at only a slight incline from the vertical plane of the motor and that the oppositely disposed shouldered portions provide a support for the manifold in a horizontal plane with respect to the motor. Intake and exhaust chambers are formed in the valve housings, and in the housings and their shouldered portions is a passage 25 communicating with the top of the exhaust chambers and extending upwardly therefrom at an incline.

The passage 25 connects with the passage 32 formed in the wall of the manifold and has a direct communication with the jacket or space 31. Thus a portion of the discharge gases on entering the discharge chamber will pass through the passages 25 and 32 to the jacket and from thence through the bores or ports 46 to the intake

manifold. These communications or ports become fouled by carbon deposits from the exhaust gases. It will be observed that the rocker arm is mounted to reciprocate oppositely disposed plungers adapted to engage the ports and that the rocker arm being connected by a suitable linkage to one of the control elements of the motor, the rocker arm is manipulated concomitantly with the operation of the motor.

While I have shown and described the preferred embodiment of my invention, I wish it to be understood that I do not confine myself to the precise details of construction herein set forth, by way of illustration, as it is apparent that many changes and variations may be made therein, by those skilled in the art, without departing from the spirit of the invention, or exceeding the scope of the appended claims.

Having described the various features of my invention, what I claim as new and desire to secure by Letters Patent is:

1. In an internal combustion engine, the combination with an intake manifold having a heating chamber, the manifold having ports communicating with the heating chamber, plungers co-operating with the ports and means for alternately actuating the plungers to remove carbon deposits from said ports.

2. In an internal combustion engine, the combination with an intake manifold having a heating chamber, the manifold having oppositely disposed ports, reciprocating plungers mounted to co-operate with the ports and means for alternately reciprocating the plungers.

3. In an internal combustion engine, the combination with an intake manifold having a heating chamber, the manifold having oppositely disposed ports communicating with the heating chamber, reciprocating plungers mounted to engage the ports, and a rocking arm for reciprocating the plungers.

4. In an internal combustion engine, the combination with an intake manifold having a heating chamber, the manifold having oppositely disposed ports forming communications between the manifold and the heating chamber, reciprocating plungers mounted to engage the ports, a pivoted rocking arm connecting the plungers and means for rocking the arm to reciprocate the plungers.

5. In an internal combustion engine, the combination with an intake manifold having a heating chamber, the manifold having ports communicating with the heating chamber, plungers mounted in the wall of the heating chamber adapted to engage the ports, a rocking arm connecting the plungers and means associated with the throttle of the engine for actuating the rocking arm.

6. In an internal combustion engine, the combination with an intake manifold having a heating chamber, the manifold having oppositely disposed ports communicating with the heating chamber, plungers mounted in the wall of the heating chamber adapted to engage the ports, a rocking arm pivoted on the heating chamber and connected at its respective ends to the plungers and means associated with the throttle of the engine for actuating the rocking arm.

7. In an internal combustion engine, the combination with the intake manifold, a heating chamber therefor and a carburetor connected therewith, the manifold having ports communicating with the heating chamber, of reciprocating plungers and means for actuating the plungers to enter and fill the ports to prevent the deposition of carbon therein.

8. In an internal combustion engine, the combination with the intake manifold, a heating chamber therefor and a carburetor connected therewith, the manifold having ports communicating with the heating chamber, of plungers to plug the ports consecutively and means associated with the plunger actuating means and a control element of the engine for concomitant operation.

9. In an internal combustion engine, the combination with the intake manifold, a heating chamber therefor and a carburetor connected therewith, the manifold having oppositely disposed ports communicating with the heating chamber, of plungers mounted in the wall of the heating chamber adapted to engage the ports, a semi-circular rocking arm pivoted upon the heating chamber, means for connecting the arm to the plungers and a linkage between the arm and the throttle of the carburetor.

10. In an internal combustion engine, the combination with the intake manifold, a heating chamber therefor and a carburetor connected therewith, the manifold having oppositely disposed ports communicating with the heating chamber, of plungers mounted to reciprocate in the wall of the heating chamber and to engage the ports, a semi-circular rocking arm pivotally mounted to reciprocate the plungers, and a cushioned connection between the rocking arm and the throttle of the carburetor.

11. In an internal combustion engine, the combination with the intake manifold, a heating chamber therefor and a carburetor connected with the manifold, the manifold having oppositely disposed ports communicating with the heating chamber, of plungers mounted to reciprocate in the wall of the heating chamber and to engage the ports consecutively, an arcuate rocking arm pivotally mounted and connected to the plungers and a linkage between the rocking arm and the throttle of the carburetor.

12. In an internal combustion engine, the combination with the intake manifold, a heating chamber therefor and a carburetor connected with the manifold, the manifold having oppositely disposed ports communicating with the heating chamber, of reciprocating plungers mounted in the wall of the heating chambers adapted to plug the ports consecutively, an arcuate rocking arm pivotally mounted upon the heating chamber, means for connecting the rocking arm and the plungers, and means associated with a control element of the engine for actuating the rocking arm concomitantly with the actuation of the control element.

13. In an internal combustion engine, the combination with an intake manifold having a heating chamber, the manifold having a plurality of ports communicating with the heating chamber and means including plungers cooperating with the ports to maintain at least one of the ports open.

14. In an internal combustion engine, the combination with an intake manifold having a heating chamber and a pair of ports connecting the chamber with the manifold, of plunger means associated with said ports and control mechanism connected to the plungers, actuation of the mechanism moving the plungers in opposite directions relative to their associated ports.

In testimony whereof I affix my signature.

LIONEL M. WOOLSON.