May 31, 1932. L. M. WOOLSON 1,860,641

INTERNAL COMBUSTION ENGINE

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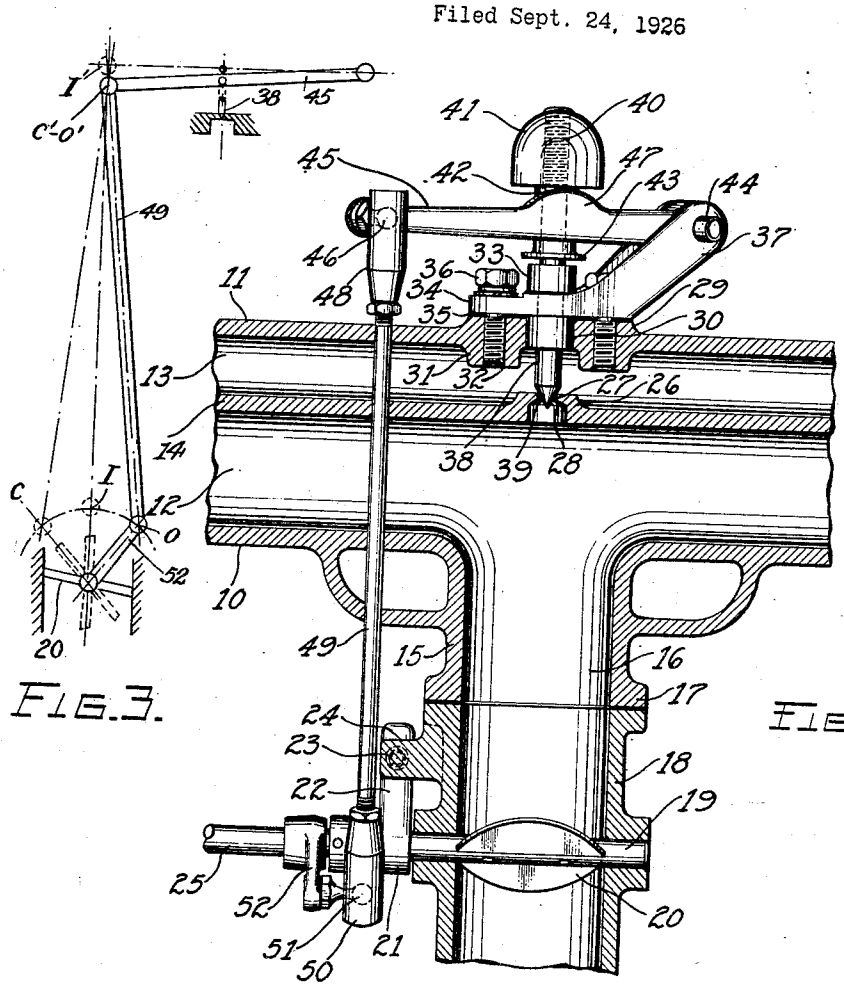


FIG. 3.

FIG. 1

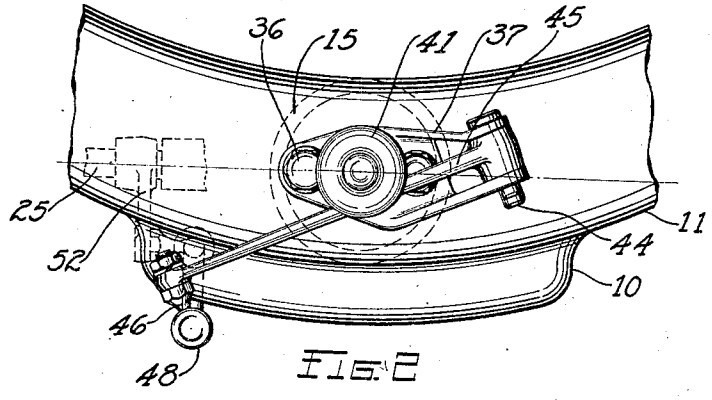


FIG. 2

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UNITED STATES PATENT OFFICE

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INTERNAL COMBUSTION ENGINE

Application filed September 24, 1926. Serial No. 137,448.

This invention relates to internal combustion engines and particularly to means for heating the mixture thereof.

It has heretofore been proposed, as in Patent No. 1,385,793 to Pierson, dated July 26, 1921, to jacket a portion of the intake pipe of an internal combustion engine with exhaust gas and discharge a portion of the exhaust gas into the intake pipe. In order to obtain the desired amount of heat at the lower throttle openings, it is necessary to use a rather large volume of exhaust gas and when this is done, idling of the engine is seriously interfered with.

One of the objects of the present invention is to provide an internal combustion engine with considerable exhaust jacket heat for the mixture and restricting the volume of exhaust gas while idling.

Another object of the invention is to provide heating means for the mixture which will be at a maximum at the ordinary running speeds of the engine, at substantial minimum at full throttle opening, and practically nil at the idling position of the throttle.

Another object of the invention is to provide means for supplying considerable exhaust heat to the mixture at the ordinary speeds of the engine and effectively cutting off the supply of heat during idling.

With exhaust jacketed heaters for internal combustion engines, it is found that some carbon usually gathers in them and if the exhaust gases are discharged into the intake pipe, the opening or port for this purpose is sometimes fouled. It is one of the objects of this invention to provide means for preventing the fouling of such a port under those conditions.

Another object of the invention is to provide means for automatically cutting off the discharge of exhaust gas to the intake pipe during idling of the engine and at the same time to prevent the formation of carbon in the discharge port.

Other objects of the invention will appear from the following description taken in connection with the drawings, which form a part of this specification, and in which:

Fig. 1 is a vertical transverse sectional view through a portion of an intake manifold having an exhaust jacket, illustrating the invention as applied, and

Fig. 2 is a top plan view of the same.

Fig. 3 is a diagrammatic view of the valves and control linkage, shown in different positions of the throttle valve.

Referring by numerals to the drawings, 10 represents the intake manifold of an internal combustion engine a portion of which is jacketed by an exhaust chamber 11. The intake manifold and exhaust chamber are cast in one piece with an intake passage 12 and an exhaust passage 13 separated by a wall 14. It will thus be apparent that heat from the exhaust gases passing through the exhaust passage 13 is directly transferred to the inlet passage 12 since these passages are separated only by the wall 14, hence the incoming gases are heated and are thereby greatly enhanced in value.

The intake manifold 10 is formed with an integral sleeve 15 having a passage 16 communicating with the passage 12 and a flange 17. Secured to or mounted upon the flange 17 in the conventional manner is a carburetor 18 having the usual transverse shaft 19 upon which is mounted a throttle valve 20. Keyed upon the shaft 19 is a sleeve or collar 21 having an arm 22 in which is mounted a set screw 23 adapted to engage a stop 24 to regulate the throw of the valve. Keyed or otherwise secured in the sleeve 21 is a shaft 25 connected by suitable linkage to a lever, not shown.

Formed upon the wall 14 in the exhaust passage 13 and in axial alinement with the passage 16 in the sleeve 17 is a boss 26. The boss 26 is centrally bored as indicated at 27 and is counter bored to form a frusto conical shoulder 28. In this formation of a communication between the exhaust and intake passages it will be observed that the portion of the wall surrounding the bore 27 is quite thin and that the counter bore or discharge end of the opening is comparatively large. The objects of this structure will hereinafter fully appear.

In axial alinement with the bore 27 upon the outer surface of the exhaust chamber is a

boss 29 having a central bore 30 and oppositely disposed to the boss 29 in the exhaust passage 13 are two bosses 31 of smaller diameter. The bosses 31 are spaced apart at an equal distance from the bore 30 and are each centrally bored as indicated at 32.

Mounted in the bore 30 is a sleeve 33. The sleeve 33 fits snugly in the bore 30 and is provided with a flange or collar 34 bearing against the boss 29 with a suitable gasket 35 interposed. The flange 34 is apertured to receive studs 36 mounted in the bores 32 to clamp the flange tightly upon the boss 29 and thereby retain the sleeve 33 in position. The flange 34 has formed thereupon two inclined arms 37 the free ends of which are bent parallel with respect to each other to form a bracket in which is pivoted an operating lever to be hereinafter described.

Mounted in the sleeve 33 is a Monel metal pin or needle 38. This needle is mounted to reciprocate and to revolve and is provided with a conical end 39. The conical end 39 engages the bore 27 and when resting therein tightly closes the same. The conical end of the needle in addition to forming a perfect closure for the bore 27 serves to keep the same free from carbon by its contact therewith. When in a closed position and the vehicle is proceeding under low or closed throttle, the vibration produced by the uneven surface of the ground upon which the vehicle is running causes the pin or needle 38 to jiggle up and down in the port 27 and thereby remove any obstruction or carbon that might be deposited therein.

The action of the pin or needle in its rotary and vertical movement produced by the jiggling thereof and by other means to be hereinafter described, grinds a seat in the bore 27 for the conical end 39 and in the grinding thereof the carbon deposited by the exhaust gases in escaping through the bore or port 27 is quickly and efficiently removed. The other end of the pin or needle 38 is threaded as indicated at 40 and mounted thereupon is a weight 41 having a sleeve 42 upon which is formed a flange 43. The weight 41 is sufficiently heavy to quickly return the needle and seat its conical end 39 in the bore 27 when it is raised and released by a control means to be hereinafter described.

It will be observed that in the arrangement of the bore or port 27 in the wall 14 and the needle 38 co-operating therewith, there is produced a valve between the intake and exhaust passages 12 and 13. This valve is normally held closed by the weight 41. Pivoted at one end between the arms 37 by a bolt 44 is an arm 45 the other end of which is provided with a ball stud 46. The arm 45 is positioned adjacent to the sleeve 42 between the weight 41 and the flange 43 and is formed with a curved shoulder or edge 47 which engages the weight 41. There is sufficient play for the arm between the weight and flange to prevent binding between the parts and to permit a quick return of the needle to close the port when the weight is raised and lowered, also to permit a slight vibration or jiggling movement of the pin and weight when not supported by the arm 45. The curved shoulder 47 on the arm 45 imparts a rotary motion to the pin when raising and lowering the weight, hence the added grinding action between the port 27 and the conical end 39 of the needle, hereinbefore referred to.

Mounted upon the ball stud 46 is a socket 48 threaded upon one end of a rod 49. The other end of the rod 49 is provided with a socket 50 in which is a ball stud 51 mounted on an arm 52 keyed upon the shaft 25. The shaft 25 is an operating shaft connected to the throttle and by a suitable linkage to a control element for actuating the throttle, hence in actuating the throttle the valve between the exhaust and intake passages is opened and closed concomitantly. The linkage between the throttle and the valve is adjusted so that the maximum quantity of exhaust gases is introduced into the intake passage when the throttle is positioned for ordinary speed, substantially minimum when the throttle is opened full, and practically nil when the throttle is in a substantially closed position or while the engine is idling. This is illustrated in Fig. 3 in which C indicates the position of arm 52 when the throttle valve 20 is closed, O indicates the corresponding position when the throttle is open, and I indicates an intermediate position, the corresponding positions of the valve 39 being indicated at C′, O′ and I′ respectively.

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 my invention, what I claim and desire to secure by Letters Patent is:

1. A combustible mixture intake manifold having a heating chamber, a valve between the manifold and the heating chamber, a weight upon the valve stem, a flanged sleeve upon the weight and a lever between the weight and flange for raising, lowering and rotating the valve.

2. A combustible mixture intake manifold having a heating chamber, a valve between the manifold and the heating chamber, a semi-spherical weight threaded to the valve stem, a flanged sleeve upon the weight, a lever

between the weight and the flange, a curved shoulder upon the lever adapted to engage the weight and means for actuating the lever to raise, lower and rotate the valve.

3. A combustible mixture intake manifold having a heating chamber, a valve between the manifold and heating chamber, a flanged sleeve upon the valve stem, a weight integral with the sleeve, the weight threaded to the valve stem, a bracket in juxtaposition to the valve, a lever pivoted in the bracket and positioned between the weight and flange, an arcuate shoulder upon the lever adapted to engage the base of the weight and a linkage connecting the lever to a control element of a motor.

4. A combustible mixture intake manifold having a heating chamber, a valve between the manifold and the heating chamber, the stem of the valve projecting through the wall of the heating chamber, a flanged sleeve upon the valve stem, a weight integral with the sleeve, the weight threaded to the valve stem, a bracket in juxtaposition to the valve, a lever pivoted in the bracket, an arcuate shoulder upon the lever adapted to engage the base of the weight, and means associated with a control element of a motor for concomitantly actuating the lever with the control element.

5. In an internal combustion engine, an intake and an exhaust manifold for the engine, a ported wall connecting the intake and exhaust manifolds, and a needle valve associated with the port in said wall, said valve being free to reciprocate and to rotate in normal operation.

6. In an internal combustion engine, an intake and an exhaust manifold for the engine, means connecting the intake and exhaust manifolds, a valve slidably mounted in said connecting means and pivoted means in contact with the valve for rotating the valve.

7. In an internal combustion engine, an intake and an exhaust manifold for the engine, means connecting the intake and exhaust manifolds, a valve in said connecting means, a throttle valve in the intake manifold, and means for reciprocating and rotating the valve in said connecting means concomitantly with the operation of the throttle valve.

8. In an internal combustion engine, an intake and an exhaust manifold for the engine, means connecting the intake and exhaust manifolds, a valve in said connecting means, a throttle valve in the intake manifold and pivoted means in contact with the valve for rotating the valve concomitantly with the operation of the throttle valve.

In testimony whereof I affix my signature.

LIONEL M. WOOLSON.