April 5, 1927. 1,623,053

F. A. HOWARD ET AL

ART OF CONTROLLING COMBUSTION IN INTERNAL COMBUSTION ENGINES

Filed Dec. 30, 1922

Fig. 1.

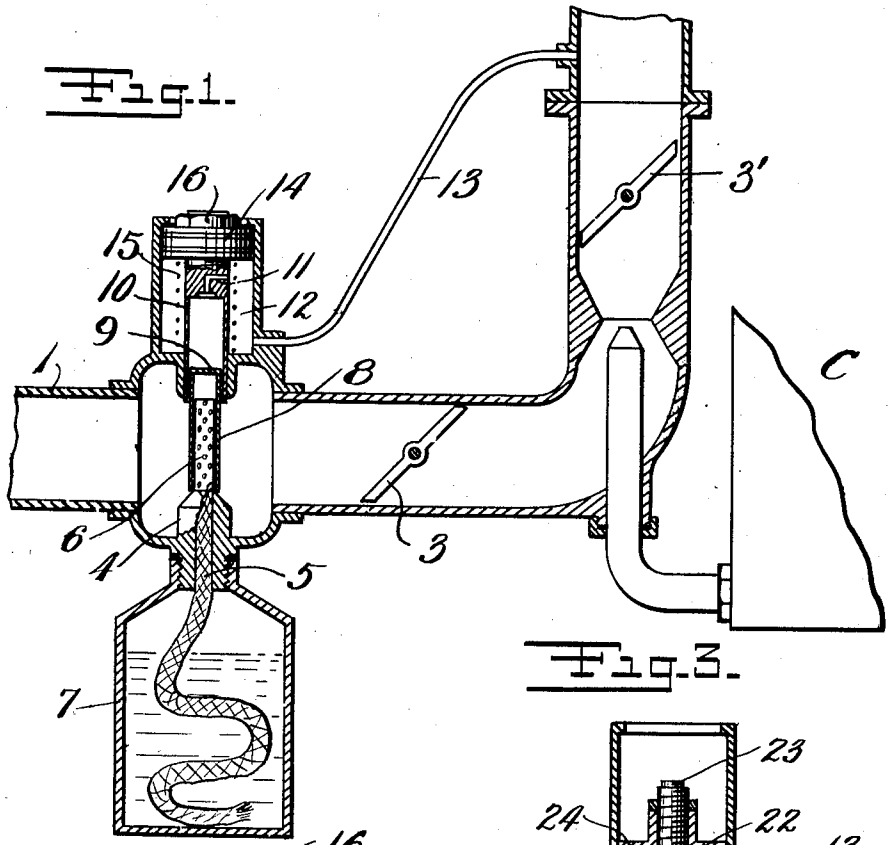


Fig. 2.

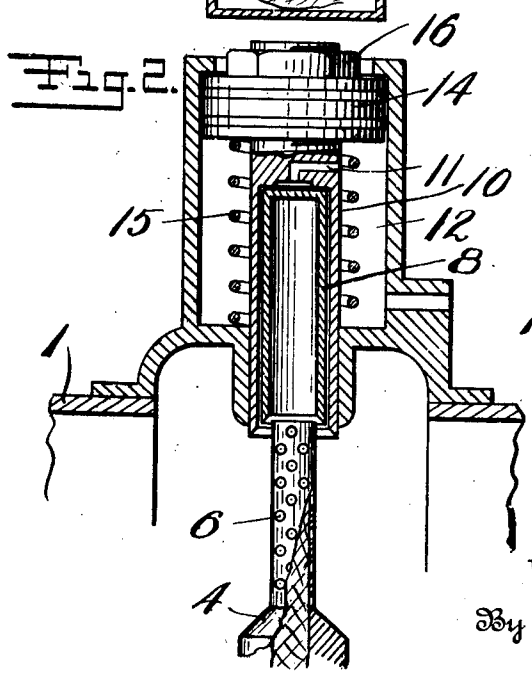
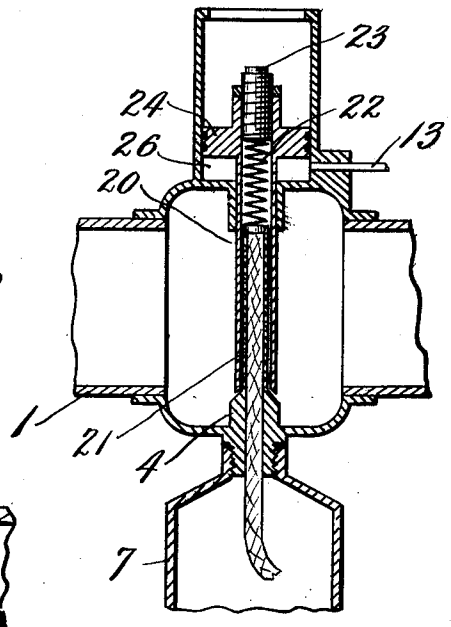


Fig. 3.



Inventors
Frank A. Howard and James R. Wright.
By O. G. Messenger
Attorney

Patented Apr. 5, 1927. 1,623,053

UNITED STATES PATENT OFFICE.

FRANK A. HOWARD AND JAMES R. WRIGHT, OF ELIZABETH, NEW JERSEY, ASSIGNORS TO STANDARD DEVELOPMENT COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

ART OF CONTROLLING COMBUSTION IN INTERNAL-COMBUSTION ENGINES.

Application filed December 30, 1922. Serial No. 609,913.

This invention relates to internal combustion engines and will be fully understood from the following description, reference being had also to the accompanying drawing, in which—

Fig. 1 represents a central sectional view of one form of apparatus contemplated in the invention;

Fig. 2 is a sectional detail on an enlarged scale, showing the position of parts when the engine is under certain load conditions; and

Fig. 3 is a sectional detail of a modification.

Referring more particularly to the drawing, the reference character 1 designates the air intake leading to a carbureter C of any desired form, the usual choker valve 3 and throttle valve 3′ being provided. Extending into the air passage is a tube 4 carrying a wick 5 which projects above into a perforated wick-cage 6 and below into a liquid container 7. Advantageously this container is attached to the tube 4 by a screw thread joint or the like, so as to be readily detachable, it being contemplated that such a container will supply in convenient manner a chemical agent efficient in modifying the combustion of hydrocarbon fuels to the end of checking knocking or detonation. Slidable over the wick-cage 6 is a sleeve or cover 8 whose upper end 9 is closed so as to act as a piston in the outer sleeve 10, a duct 11 communicating with the cylinder chamber 12, from which in turn a pipe 13 connects to the intake manifold. The outer sleeve or cover 10 is also slidable, having a piston 14 in the cylinder chamber 12. An expansion spring 15 bears against the under side of the piston and is adjustable by virtue of the adjusting nut 16 which crowds the snugly fitting piston along the extended end of sleeve 10.

When the engine is at rest, the pressure in the intake manifold, as communicated through pipe 13 to the under surface of piston 14 and on through duct 11 to the top of piston 9 is not different from the pressure effective upon the other sides of the respective pistons. Correspondingly the piston 9 with sleeve 8 is affected only by gravity and the sleeve is down over the wick-cage, acting as a cover against evaporative waste of the liquid, and the outer sleeve 10 is held up by the spring 15. When the engine is running, the pressure from the intake manifold through pipe 13 is less than that effective on the under side of piston 9 and the sleeve 8 is correspondingly raised up into the outer sleeve 10, thus exposing the wick so that the chemical agent supplied thereby is volatilized from its moist surface and carried to the engine cylinders with the fuel mixture provided by the carbureter. The amount of the chemical agent or knock-controller so supplied is sufficient to check knocking. The precise reason for the action is not yet definitely established, and whether the metallo-organic compounds and other chemical agents used act by a catalytic function or otherwise, we content ourselves here with stating the results, without entering into a discussion of the various possible theoretical explanations of why such results occur. When the engine speed exceeds that for which the spring 15 has been set, the piston 14 is carried down, taking with it the inner sleeve 8 and covering the wick. This prevents needless waste of the knock-controlling agent when the engine conditions are such as not to require it.

In the modification shown in Fig. 3, a single sleeve or cover 20 is arranged to slide over the wick cage 21. The top of the cage forms an abutment which supports an expansion spring 22 bearing above against an adjusting screw 23 in the piston 24 which is attached to the sleeve. A pipe 13 connects the cylinder chamber 26 below the piston with the intake manifold, as in the form shown in Fig. 1, and the other relationships are the same, the wick-tube 4 being set in the air intake 1 and having the detachable liquid-container 7 below. In this form, the sleeve 20 is held up by the spring 22 until the engine runs at a speed exceeding that for which the spring 22 is adjusted, when the lessened pressure under the piston, as communicated from the intake manifold,

allows the preponderant air pressure above the piston to force the sleeve down over the wick and thus there is prevented excessive feed and waste of the chemical agents where not necessary. Evaporative loss while the engine is not running, being relatively small is ignored in this form.

While this invention has been described by reference to certain specific details, it will be understood that this is for the purpose of illustration, rather than limitation, and the invention is to be regarded as limited only as defined in the following claims, in which it is our intention to claim all inherent novelty as broadly as the prior art permits.

What we claim is:

1. The combination with an air intake and manifold and carburetor of an internal combustion engine, of a wick tube and wick cage projecting into the air intake, a wick in said tube and cage, a container for liquid detachably connected to the lower end of the wick tube, a sleeve slidable over the wick cage and closed at its upper end to form a piston, an outer sleeve slidable over the inner sleeve and having a piston on its upper end, a spring supporting said latter piston, an adjusting nut, and a pipe connecting the space between the two pistons with the intake manifold.

2. The combination with an air intake and manifold and carburetor of an internal combustion engine, of a wick projecting into the air intake, means for supplying a liquid to said wick, a sleeve slidable over the wick and closed at its upper end to form a piston, an outer sleeve slidable over the inner sleeve and having a piston on its upper end, a spring supporting said latter piston, and a pipe connecting the space between the two pistons with the intake manifold.

3. The combination with an air intake and manifold and carburetor of an internal combustion engine, of a wick exposed in the air intake, means for supplying a liquid to said wick, a sleeve slidable over the wick, a piston attached to said sleeve, a spring supporting said piston, and a pipe connecting the space under the piston with the intake manifold.

4. The combination with an air intake and manifold and carburetor of an internal combustion engine, of an evaporative surface exposed in the air intake for feeding a knock-controlling chemical, a cover slidable over said evaporative surface, and means for actuating said cover determined by changes of pressure in the intake manifold.

5. The combination with an air intake and manifold and carburetor of an internal combusition engine, of means located in the air intake and adapted for feeding knock-controlling vapors, and means for governing such feed determined by changes of pressure in the air intake passage.

6. The combination of a wick, means for supplying a liquid to said wick, a sleeve slidable over the wick and closed at its end to form a piston, an outer sleeve slidable over the inner sleeve and having an actuating piston, resilient means for supporting said last named piston, and means for communicating the pressure in the intake manifold of an internal combustion engine to the space between the two pistons.

7. The combination of a wick, a sleeve slidable over the wick, a piston attached to said sleeve, resilient means for supporting said piston, and means for communicating the pressure in the intake manifold of an internal combustion engine to the space below the piston.

8. The combination of an evaporative surface for supplying a knock-controlling chemical, a cover slidable over said evaporative surface, and means for actuating said cover governed by changes of pressure in the intake manifold of an internal combustion engine.

9. The method of controlling knocking or detonation in internal combustion engines, which comprises vaporizing a chemical agent exposed to the air current supplied to the engine, and regulating the extent of exposure and correspondingly the amount of vapor supplied, by changes in pressure in the air intake passage.

10. The method of controlling knocking or detonation in internal combustion engines, which comprises vaporizing a chemical agent exposed to the air current supplied to the engine, passing the vapor together with air into the manifold of the engine, and regulating the amount of vapor supplied, by changes in pressure in the air intake passage.

11. In apparatus for feeding a knock-controlling agent to the intake manifold of an internal combustion engine, a chamber formed in part by opposed pistons, means for establishing communication between the chamber and the intake manifold whereby the position of the pistons is controlled by the pressure differential between the exterior of the chamber and the intake manifold, a source of supply of the knock-controlling agent, and a closure for the same carried by one of the pistons.

12. In apparatus for supplying a material to the intake manifold of an internal combustion engine, a source of supply of the material, a closure for said source, a piston carrying said closure, means connecting the space above said piston with the intake manifold whereby upon a predetermined fall of pressure in the intake manifold the piston will be elevated, and a second piston adapted upon a further fall of pressure to

return said first piston to its former position.

13. The combination with the air intake and manifold and carburetor of an internal combustion engine, of vapor-supplying means in the air intake, a closure for said vapor-supplying means, pressure operable mechanism adapted to position said closure, and a pipe connecting the intake manifold at a point beyond the throttle valve with the said mechanism.

FRANK A. HOWARD.
JAMES R. WRIGHT.