

Aug. 29, 1933.

E. BARTHOLOMEW

1,924,704

REMOVING CARBON DEPOSITS FROM INTERNAL COMBUSTION ENGINES

Filed June 25, 1931

2 Sheets-Sheet 1

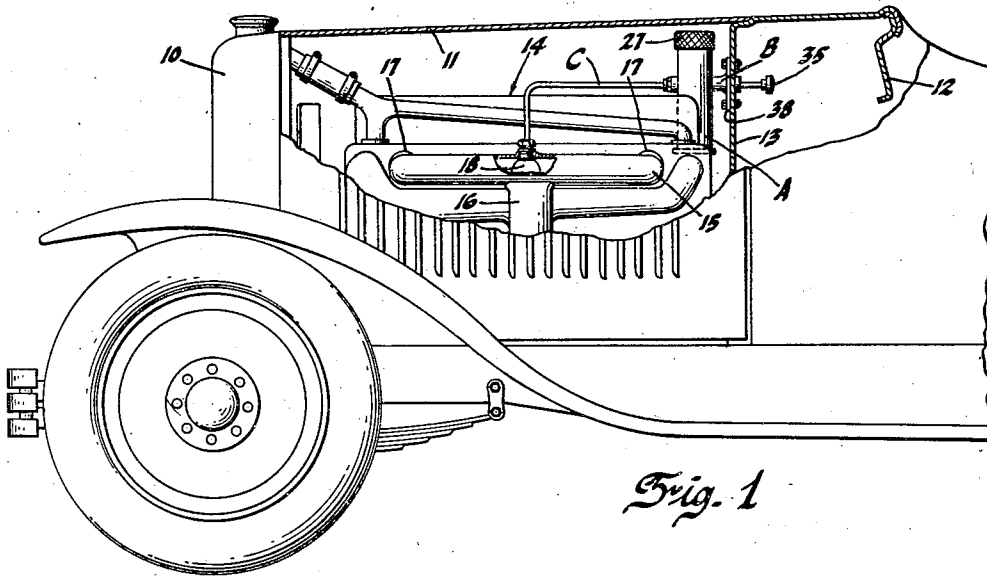


Fig. 1

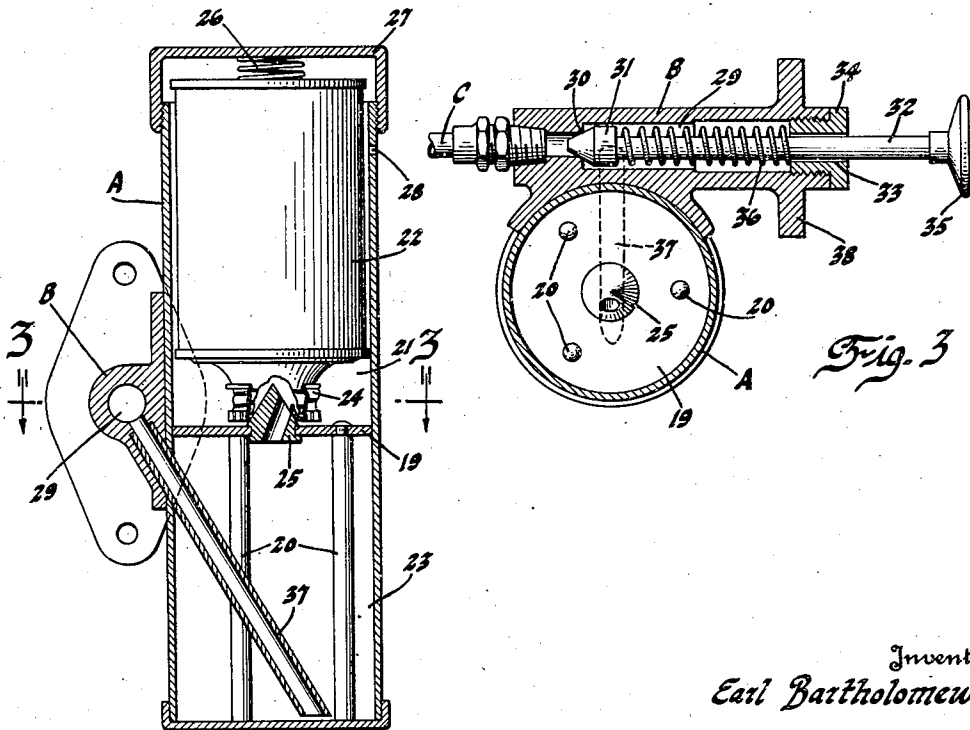


Fig. 2

Fig. 3

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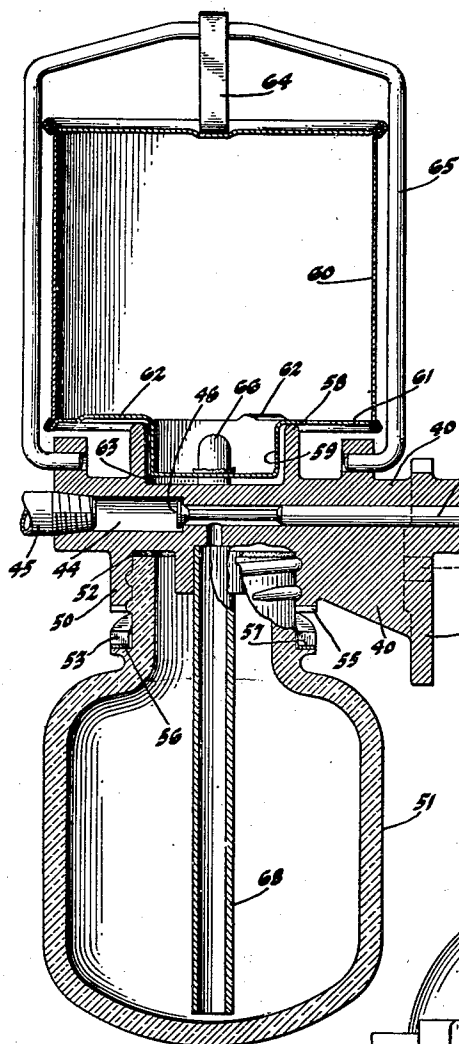


Fig. 4

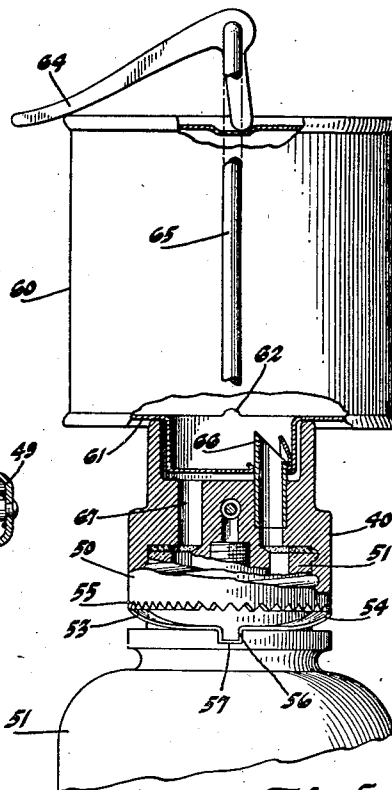


Fig. 5

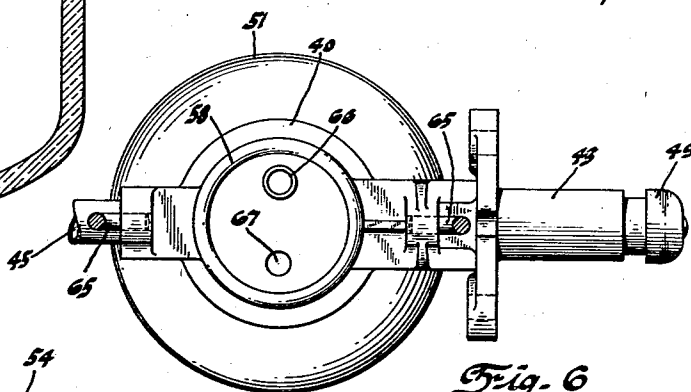


Fig. 6

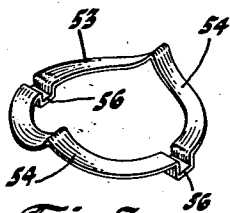


Fig. 7

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UNITED STATES PATENT OFFICE

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REMOVING CARBON DEPOSITS FROM INTERNAL COMBUSTION ENGINES

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Application June 25, 1931. Serial No. 546,812

4 Claims. (Cl. 123—198)

This invention relates to the removal of carbon deposits which collect on the walls of the combustion chamber and on the valves and valve stems of internal combustion engines.

Many different methods have been used for applying a carbon remover to these deposits, including injecting through spark plug holes and petcocks and feeding the carbon remover into the manifold from a simple container fastened onto the manifold. The principal objects of the present invention are to simplify the handling of the carbon remover, improve the mode of using it, and to promote the commercializing of carbon removers by an improved construction and operation which frees the driver from dependence on filling stations or garages, and from getting his hands into dirt or chemicals.

This application is a continuation in part of my prior application Serial No. 383,762, filed August 5, 1929.

In the accompanying drawings which represent one embodiment of my invention

Figure 1 is a side view of the front part of an automobile with a part of the hood and dash cut away to show the installation of the carbon removing apparatus.

Figure 2 is a longitudinal sectional view of the container for the carbon remover.

Figure 3 is a transverse sectional view of the container taken on line 3—3 of Figure 2.

Figures 4 and 5 are vertical sectional views of another form of injecting device constructed particularly so that the base of the injector may be made by die casting.

Figure 6 is a plan view of the die casting.

Figure 7 is a perspective view of a lock washer.

In these drawings 10 is a diagrammatic showing of a conventional form automobile body having a hood 11, instrument board 12, and dash board 13 and engine 14. While the apparatus is adapted for use with any type of engine there is illustrated a six cylinder engine with a three port manifold 15. 16 denotes the manifold riser, 17, 17, the end ports opening into the engine and 18 the middle port.

The carbon remover feeding device comprises the container A, the control mechanism B and the supply tube C. In the form shown the control mechanism B is mounted on the side of the container A to facilitate unit manufacture and installation. As shown the installation may be on the inside of the dash board 13.

The container is a metal cylinder having a transverse dividing plate 19 shown herein as supported on three legs 20 so that the plate may be readily removed. Above this plate 19 is a chamber 21 for receiving a can 22 containing a new charge of carbon remover. Below the plate 19 is a second chamber 23. The can is shown in its final position with its cap 24 forced onto and punctured

by a hollow upwardly projecting boss 25 on the dividing plate 19. The can is held in position by a coiled spring 26 which is forced against the bottom of the can by the screwed on cover 27 which closes the top of container A. A hole 28 in the wall of container A admits air as the carbon remover is fed to the engine.

The control mechanism B is shown as a horizontal casting formed on the side of the container A and having a longitudinal stepped bore 29 (Figure 3), the step 30 forming the seat for a conical valve 31. The valve stem 32 projects through an opening 33 in a valve plug 34 and terminates in a handle 35. A spring 36 acting against the valve 31 and plug 34 keeps the valve seated until the operator opens the valve by pulling on the handle 35.

The valve handle is used so little that it is shown projecting through the dash board 13 into the body of the car but not through the instrument board 12. Obviously the handle may be placed at any convenient point. Flange 38 on the control mechanism B is secured as by bolts to the dash board 13 and supports the apparatus.

The opening 33 is made relatively large so that the valve stem 32 fits loosely in it and so affords space for air to pass around the valve stem into the bore 29. If the valve should leak the air will be drawn in and prevent a slow feeding of the carbon remover when this is not desired.

The tube 37 extends from the bore 29 to a point near the bottom of chamber 23 beneath the dividing plate 19.

The supply pipe C leads from the outlet of the valve chamber B to the intake manifold 15 and feeds the carbon remover into the gasoline-air stream so that the normal operation of the engine provides for feeding and distribution. It has been found that in manifolds like the three port manifold illustrated the distributing of the carbon remover is improved if the carbon remover is directed into the riser against the flow of the fuel mixture. In this type of manifold there is a header having branches or ports leading to the cylinders and a mixture intake substantially at right angles to the header.

The lower chamber 23 of container A is preferably made large enough to hold the contents of can 22 and so permit the can to empty completely before the valve is opened, as otherwise the liquid may be drawn from the chamber 23 more rapidly than it empties from the can.

In normal operation a supply of filled cans may be kept at home or the cans may be purchased as needed. The cover 27 and spring 26 are removed, a can 22 is inserted upside down and pressed against the boss 25 until the cap 24 is punctured. Then the spring 26 and cover 27 are replaced. At the end of a run or when the engine is hot, the engine is speeded up to about 1800 R. P. M. and

the valve is opened by pulling on the handle 35. When using mixtures such as 4 parts of aniline, 2 parts of benzol and 2 parts of alcohol (by volume) the feeding of this rich mixture into the engine stops it. During the feeding the mixture is spread over all the carbon coated surfaces where it dissolves or loosens the binder. After the binder is loosened, the operation of the engine blows the carbon deposit out the exhaust.

It is advantageous to have a small clearance space, as shown, between the wall of the can 22 and the inner wall of the container A and to have the top of the can project above the top of the container. This construction minimizes the splashing of carbon remover on top of the can and facilitates the removal of the latter without coming into contact with the chemical used.

The major features of the construction shown in Figures 1, 2 and 3 are retained in the form of device shown in Figures 4 to 7 inclusive but the latter form has been designed for lower cost of manufacture and to facilitate use. The chief difference between the two forms is that the body of the metal part in the second form has been simplified and so formed that it can be made as a die casting.

In this simplified form the die casting or base 40 carries a flange 41 having holes 42 to receive bolts so that the base can be secured to the cowl or instrument board with a boss 43 carried by the base projecting into the driver's compartment of the automobile. A stepped bore 44 extends through the boss and base to outlet tube 45 which carries the carbon remover to the engine. This bore is normally closed by a valve 46 yieldingly held against its seat by a compression spring 47 surrounding the valve stem 48 and acting against the valve button 49 so that the valve is opened by pressing on the button 49 as contrasted with pulling on the valve handle 35 shown in Figure 3.

On the lower side of the base 40 is an annular boss 50 screw threaded on its inner wall to receive the threaded neck of a glass bowl 51. A cork gasket 52 seals the upper end of the bowl neck and a spring washer 53 (Fig. 7) prevents the bowl from jarring loose. This spring washer is formed with upwardly projecting relatively sharp points 54 which catch on the serrations 55 on the lower side of the base 40, and with wide downwardly projecting segments 56 which rest in depressions 57 in the glass bowl. When the bowl is attached as shown the washer has sufficient depth and flexibility to permit the bowl neck to be firmly seated against the washer 52 and the compression of the spring and its interconnection with the associated parts prevents loosening.

On the top surface of the base 40 is an annular raised seat 58 for receiving the neck 59 of an inverted sealed can 60 containing a charge of carbon remover. The lower surface 61 of the can 60 rests on the seat 58. Radial depressions 62 in the can wall 61 permit air to enter the space 63 around the neck of the can. A lever 64 and bail 65 hold the can in position. Within the seat 58 is an upwardly projecting hollow punch 66 which pierces the neck of the can when the can is pushed down to the seat 58. This opening extends through the punch and base to permit the contents of the can to drain into the glass bowl 51. The base 40 has a second vertical opening 67 which permits air to flow into the glass bowl at

a point above the surface of the liquid therein.

A tube 68 extends downwardly from the base to a point near the bottom of the glass bowl and at its upper end communicates with the stepped bore 44 in back of the valve 46 so that normally the contents of the bowl are not drawn into the outlet tube 45. To prevent a slow draining of the bowl when the valve does not seat properly, the stepped bore 44 is placed in restricted communication with the atmosphere as by making a loose fit of the valve stem 48 in the stepped bore.

Normally the glass bowl 51 is large enough to take the full charge contained in the can 60 and the use of a transparent bowl permits the user to see if there is a charge ready for use. To fill the glass bowl, the bail and lever are moved to one side, the empty can is removed, a sealed can containing a charge of carbon remover is inverted and pressed downwardly on the punch until the can is punctured and is seated on the annular projection 58. The contents of the can drains readily into the glass bowl preferably to a level below the base so that the liquid will not enter the stepped bore and seep into the car body.

The preferred mode of using the injector is to warm up the engine, run it rapidly and step on the button 49. The engine suction will draw the contents of the bowl into the intake and distribute it among the cylinders. When using carbon removing compounds such as a mixture of furfuryl alcohol and xylene a charge of about 20 c. c. per cylinder will usually stop ignition and the engine will stop. The ignition switch is then thrown off. After the carbon remover has dissolved the binder the engine is started and the loosened carbon is blown out the engine exhaust.

I claim:

1. Carbon remover supply means for internal combustion engines comprising a container vented near its top and having two chambers in communication with each other, one chamber being adapted to receive a can holding a carbon remover, the other chamber being adapted to receive and hold the contents of the can, and fluid conducting means leading from the bottom of the second chamber.

2. Carbon remover supply means for internal combustion engines comprising a container having two chambers in communication with each other, one chamber being adapted to receive a closed can holding carbon remover, the other chamber being adapted to receive and hold the contents of the can, can opening means between the two chambers, and valve controlled means leading from the second chamber.

3. In a device for injecting a predetermined quantity of carbon remover into an engine, the combination of a puncturable can adapted to contain a predetermined quantity, means for puncturing the can, a receptacle having capacity to receive the entire contents of the can, and fluid conducting means connected to the receptacle for rapidly discharging the contents of the receptacle.

4. In a device for injecting a measured quantity of carbon remover into an engine, the combination of a support, a puncturable can, means for detachably holding said can on said support, means for puncturing the can, and a receptacle mounted below said support adapted to receive the entire contents of the can as it is punctured.

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